WP9 : Cardiovascular disease and diabetes

Report on data collection for cardiovascular disease and diabetes and related relative risks

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Abstract

This DYNAMO-HIA report relates to work package (WP) 9, "WP9 – Cardiovascular disease and diabetes". It summarises the methods used to obtain age- and gender-specific data on Ischaemic heart disease (IHD), stroke and diabetes in the 27 EU countries, as well as age- and sex-specific relative risks for the association of diabetes on cardiovascular disease. The main outputs of WP9 are a set of data on prevalence, incidence, and excess mortality data for IHD, stroke and diabetes, and for IHD and stroke 28-day case-fatality. In addition the relative risks for the association between diabetes and CVD are also provided.

List of abbreviations

The following abbreviations are used in this report:

CVD	Cardiovascular disease
IHD	Ischaemic heart disease
NIDDM	Non-insulin diabetes mellitus
DYNAMO-HIA	Dynamic Model for Health Impact Assessment project
EU	European Union
EC	European Commission
HIS	Health Interview Survey
EUROCISS	European Cardiovascular disease information surveillance
WP	Workpackage

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This report was prepared by Dr Kathleen Bennett.

Introduction

DYNAMO-HIA (DYNAmic MOdel for Health Impact Assessment – http://www.dynamo-hia.eu/root/o14.html) project is an EU funded project aiming to develop a web-based tool to assess the health impact of policies in the European Union (EU) through their influence on health determinants, including cardiovascular disease and diabetes. This document provides information on the Workpackage 9: "WP9 – Cardiovascular disease and diabetes. It focuses on the sources of data that were used to deliver the required age- and gender-specific data on prevalence, incidence and excess mortality of IHD, stroke and diabetes, and 28-day case fatality for IHD and stroke. In addition, data on relative risks associated with diabetes and cardiovascular disease are provided.

WP9 was led by the Haughton Institute, Dublin but it involved all associated partners and all 25 collaborating partners. The three main objectives of WP9 were:

1. To contribute to the discussion on specification of the model and specification of scenarios in WP9 ("Model specification and scenarios);
2. To deliver: age- and gender-specific data on prevalence and/or incidence and mortality of cardiovascular disease and diabetes in as many EU countries as possible, using existing data sources, to create an EU-wide dataset.
3. To apply the model using these data in an application and (this will contribute to WP2 – "Dissemination of the results").

The main output of this WP are a set of data on incidence, prevalence and excess mortality of IHD, stroke and diabetes and 28-day case fatality for IHD and stroke in Europe. In addition the relative risks between diabetes and cardiovascular disease. Another output will be a paper on an application of the DYNAMO-HIA model for cardiovascular disease and diabetes.

The following sections discuss the data collection methods used to gather information on cardiovascular disease and diabetes and relative risks.

Part 1 Estimating data on cardiovascular disease and diabetes

1.1 Definition of Ischaemic heart disease (IHD)

The study used the definitions as given in the EUROCISS project (http://www.cuore.iss.it/eurociss/en/project/project.asp). The EUROCISS Project (European Cardiovascular Indicators Surveillance Set) was set up in 2000 by a partnership of European Union (EU) countries to develop health indicators and recommendations for monitoring the burden and distribution of cardiovascular disease (CVD). EUROCISS was set up to improve the quality and comparability of the data. The Project was financed by the European Commission within the Health Monitoring Programme (HMP).

The following gives the ICD codes used in defining IHD
MORTALITY

- **Mortality rate**: annual deaths from IHS per 100,000 population. ICD codes: ICD-9 410 – 414 and ICD-10 I20 - I25.

MORBIDITY

- **Hospital discharge rate**: annual IHD hospitalizations per 100,000 population. ICD codes: ICD-9 410 – 414 and ICD-10 I20 - I25.

1.2 General approach for obtaining data on Ischaemic heart disease

Several different approaches were considered for obtaining data on IHD across the countries. Firstly, the EUROCISS project was used to obtain a link to possible sources of data for IHD. The EUROCISS lists the following databases available at the European level.

Statistical databases of the World Health Organization (WHO)

The WHO Mortality database (MDB) and the Health for All Statistical dataBase (HFA-DB, 1) contain data on about 600 health indicators, more specifically: basic demographic and socio-economic indicators; lifestyle and environment-related indicators; mortality, morbidity and disability indicators; hospitalization, health care resources, health care utilization and expenditure indicators.

The HFA-DB provides the following indicators in each country: number of hospitalizations for circulatory system diseases, ischaemic heart disease and cerebrovascular disease; incidence of ischaemic heart disease and cerebrovascular disease. In this database morbidity indicators are not available by ICD code, sex and age. Often, they are not even available for the same calendar year.

WHOSIS is another statistical database similar to the WHO HFA database above.

EUROSTAT – Statistical Office of the European Communities

- EUROSTAT is an important source of data at the European level: it provides statistical health data for all countries of the European Union as well as for Iceland, Switzerland and Norway. The database combines data from WHO, Food and Agriculture Organization (FAO) and OECD. Data on self-reported cardiovascular disease and diabetes are presented in the fourth chapter of the Report *Key data on health 2002 – data 1985-1995(2)*.

OECD – Organisation for Economic Development and Cooperation
It provides the *OECD-health data 2002* software package, which is an interactive database for comparative analyses of health systems in the thirty member countries. It is available for a fee on CD-ROM, purchasable on-line from OECD web pages. However, the OECD data are not presented by age, gender groups and therefore this data source was not considered any further.

ECHI (European Community Health Indicators) and ECHIM European Community Health Indicators monitoring)

International public health comparisons can only be made in a meaningful manner if data are not only actually available, but also comparable and of sufficient quality. In practice, the data situation is often not ideal. The ECHI and ECHIM project examines indicators across a range of health status and diseases in Europe (3). Further details are available in Appendix I.

MONICA – WHO Project

The MONICA project – MONItoring of CArdiovascular diseases – was launched at the beginning of the 1980s with the aim of assessing whether the decline in CHD mortality registered in some countries was real and, if so, how much of it could be attributed to reduction in incidence and how much to reduction in case fatality. In order to answer this question, MONICA project monitored 37 populations from 21 countries for 10 years in order to measure attack rates and case fatality of coronary and cerebrovascular events, treatments during acute phase and the distribution of risk factors using a standardized methodology (4). Because the data are now relatively old (mid 1980s and mid 1990s) they were not considered further within the DYNAMO project.

EUROCISS

In addition the EUROCISS project provides further details on sources of data from 16 of the 27 EU countries. These include: United Kingdom, the Netherlands, Belgium, France, Spain, Portugal, Italy, Greece, Austria, Hungary, Czech Republic, Poland, Germany, Denmark, Sweden and Finland. The additional sources of data are given below. A paper comparing coronary and cerebrovascular population-based registries across Europe concluded that although population-based registers provide the best indicators for AMI and stroke this depends on the comparability of data across countries in terms of standardisation and validity (5).

Hospital discharge records

Hospital discharge records cover almost the entire population, both genders and all ages, in nearly all countries. However, the problem with using hospital discharge records in that they only represent the subset of patients who are admitted to hospital with the disease, and neither reflect the true incidence or prevalence. In some countries, the rate of hospital discharge for AMI was used as a measure for incident IHD (Denmark, Finland and Sweden), but when this data was applied to IPM modelling, it did not produce consistent estimates. In most cases the hospital discharge records are likely to be an under or over-estimate of the true incidence rates.

Surveys on CVD

Finland, Germany, Italy, The Netherlands, Portugal and Spain regularly carry out surveys on cardiovascular diseases using the LSHTM questionnaires for the evaluation of symptoms, medical examination and ECGs. In most cases the MONICA-OMS (4) project methodology is adopted. The data from surveys tends to be self-reported diagnosis, and will only provide an estimate of prevalence of IHD. There is a database of European surveys which was examined (6).

Longitudinal cohort studies

These studies have been carried out in Belgium, Denmark, Finland, France, Germany, Italy, The Netherlands, Sweden and UK. They are performed on relatively small samples of population.

GP networks

Data from GP networks were available for The Netherlands and UK. They were used in both countries and provided the best data for estimating prevalence, incidence, excess mortality and 28-day case fatality.

Registers

Registers based on administrative data: they are on a national basis, cover all ages and both genders. They are typical of Northern countries and are based on the linkage between hospital discharge and mortality records; this is possible thanks to the identification number available in all medical records. They are economical but not always reliable.

Population-based registers: they are formed through the linkage between various sources of information (morbidity, hospital discharge and GP records) and the validation of suspected events. They cover large samples of population; the accuracy of the data related to *incidence/occurrence* depends on their completeness and quality. Data are validated using standardized procedures: the most widespread are those of the MONICA-OMS (4) project.

Differences exist between registers. In particular, AMI and stroke registers from different countries use different procedures in the selection of events. More details about the registers of AMI and cerebrovascular accidents can be found on EUROCISS website (http://www.cuore.iss.it/eurociss/en/data) and in a published paper (5).

Other sources were considered such as the SHARE questionnaires (7) and the ECHIS (8) project, the latter source not currently being available to use within the time frame of the DYNAMO-HIA project. Morbidity data are not available at the European level, partly because they are difficult to collect. A full list of literature extracted for IHD by country are presented in Appendix II.

For the purpose of comparable data across Europe an alternative approach was used. IHD mortality rates by age and gender were extracted for each country and a ratio calculated in relation to the UK. This ratio was then applied to the UK GPRD IHD incidence data for all the other countries to obtain adjusted incidence rates for the remaining EU countries (except the Netherlands which has registry data). All incidence data was subject to IPM modelling to obtain consistent estimate for prevalence and excess mortality (using RRs from GPRD). In addition, case fatality from the GPRD was used for all EU countries.

2.1 Definition of Stroke (Cerebrovascular disease)

The study used the definitions as given in the EUROCISS project (http://www.cuore.iss.it/eurociss/en/project/project.asp) according to ICD codes.

MORTALITY

- **Cerebrovascular mortality rate**: annual deaths from cerebrovascular diseases per 100,000 population. ICD codes: ICD-9 430 – 438 ; ICD-10 I60 - I69, G45.
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MORBIDITY

- **Cerebrovascular hospital discharge rate**: annual hospitalizations for cerebrovascular diseases per 100,000 population. ICD codes: ICD-9 430 – 438 ; ICD-10 I60 - I69, G45.
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2.2 General approach for obtaining data on stroke (cerebrovascular disease)

Several different approaches were considered for obtaining data on stroke across the countries. Firstly, the EUROCISS project was used to obtain a link to possible sources of data for stroke (5). The list of available data sources are described above in section 1.2.

Data from GP networks were available for The Netherlands and UK. They were used in both countries and provided the best data for estimating prevalence, incidence, excess mortality and 28-day case fatality of stroke. A full list of literature extracted for stroke by country are presented in Appendix III.

In addition, a review of available stroke incidence and prevalence data in Europe by Truelson et al (9) provided estimates of incidence and prevalence of stroke in 25 of the 27 countries. In this study the authors reviewed the published data from EU countries, Iceland, Norway, and Switzerland, and provided WHO estimates for stroke incidence and prevalence in these countries, and applied these to other countries.

3.1 Definition of non-insulin diabetes mellitus (NIDDM or type 2 diabetes)

Diabetes mellitus is a chronic disease, characterised by hyperglycaemia, resulting from defects in insulin secretion, insulin action or both. Diabetes mellitus is diagnosed, according to the WHO, by the classic symptoms of polyuria, polydipsia and unexplained weight loss, and/or a hyperglycaemia H 11.1 mmol/l (200 mg/dl) in a random sample or fasting (no caloric intake for 8 hrs), plasma glucose 7.0 mmol/l (126 mg/dl) and/or postprandial value 11.1 mmol/l (200 mg/dl) (2 hrs plasma glucose level during an oral glucose tolerance test). This test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 h anhydrous glucose dissolved in water). In the absence of unequivocal hyperglycaemia with acute metabolic decompensation, these criteria should be confirmed by repeat testing on a different day (EUDIP Definition).

In 1997, the WHO issued a new recommendation for the diagnosis and classification of Diabetes Mellitus (DM), according to which the following types of DM are distinguished (10):

- Type 1 encompasses diabetes cases with absolute insulin deficiency, triggered by a destruction of beta cells (pancreas islet cells which normally produce insulin). Type 1 is classified as type 1a (immune-mediated diabetes), in which DM is stimulated by a resistance reaction of the immune system, e.g. to viral infections, and type 1b (idiopathic diabetes), which occurs by itself and is not a consequence of other diseases.

- Type 2 diabetes (T2D) denotes all forms of diabetes with relative insulin deficiency, which can be caused by insulin resistance or secretory defects. The former classification of type 2a (normal weight) and 2b (overweight) is no longer valid. Type 2 diabetes occurs far more often than type 1 diabetes: between 85 and 95% of diabetics suffer from T2D (10).

For the purpose of the DYNAMO-HIA project the following ICD codes were used for diabetes: ICD10 E10-E14, and ICD9 250.

2.2 General approach for obtaining data on NIDDM

Different data sources were considered for European data on type 2 diabetes. Some of the available data sources are described above in section 1.2. In addition, there were some data sources that are specific to diabetes and each of these is described briefly below. A full list of literature extracted for diabetes by country are presented in Appendix IV.

The aim of the European Core Indicators in Diabetes (EUCID) project is to collect and compare data about risk factors for diabetes, complications and quality of care indicators in EU countries or future member states. 19 countries provided data for a list of indicators by age band which were representative at a regional or a national level for 2004, 2005 or 2006. The indicators for this project were designed during the EUropean Diabetes Indicators Project - EUDIP. Data were age-standardized for comparisons performed in the general population. Recently EUCID's final report was published at the DG SANCO website (11).

Another data source that was considered was the EU public health indicators project EUPHIX (12). EUPHIX is a web-based knowledge system for health professionals, policy makers and others. It presents structured European public health information, giving a special insight into similarities and differences between EU Member States. It provides some information on prevalence of diabetes but only diabetes in 2007 and estimates for 2025, in Iceland, Norway, Switzerland and the EU 27. Age-standardised diabetes prevalence are also provided but the data are considerably dated.

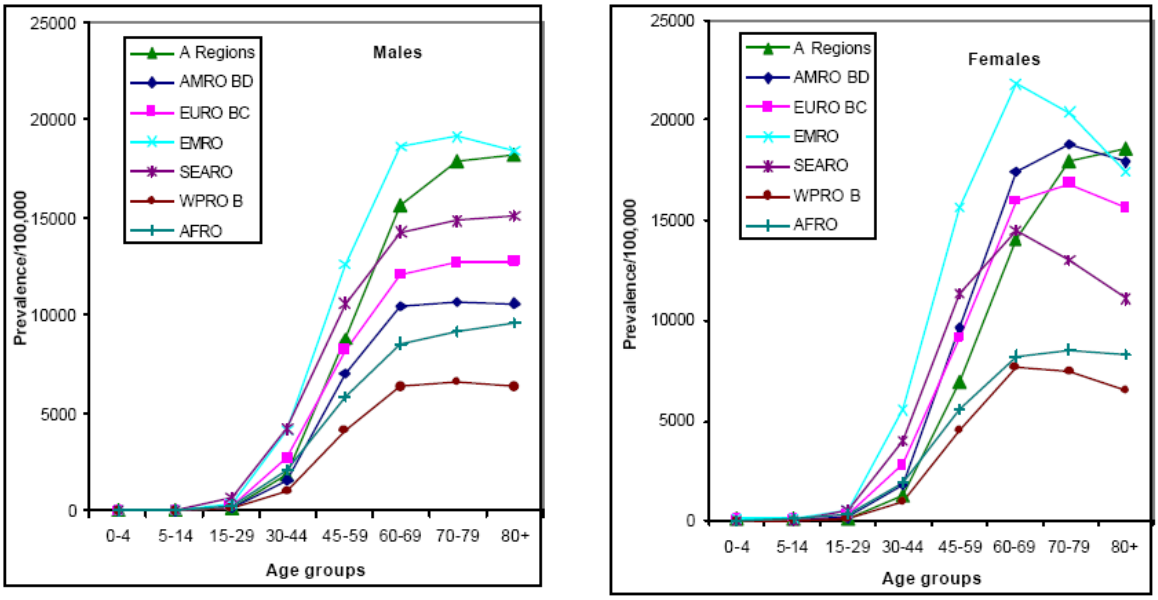
Diabetes Atlas (13) is a comprehensive publication from the International diabetes federation on diabetes prevalence across the world. Although it provides some references for data across Europe the publications were quite dated and data were not provided by specific age-groups.

The DECODE (the Diabetes Epidemiology: Collaborative Analysis of Diagnostic Criteria in Europe) study was conducted initially in 13 centres around Europe (14). The study is based on using epidemiological data on close to 30,000 subjects from twenty European epidemiological studies. The prevalence of diabetes, using fasting rather than the 2-hour glucose concentrations (as had previously been recommended for epidemiological studies) resulted in changes in the prevalence of diabetes.

The global burden disease study on diabetes provided some information on diabetes prevalence worldwide (13). However, only a small number of European studies were included, Malta, Netherlands, Poland and Spain, and the data for these countries were quite dated. Relative risks of mortality for diabetes mellitus are also provided.

Figure from GBD publication.

Figure 7.1. Diabetes mellitus prevalence rates, age group and sex, broad regions, 2000



3 Data collection and estimation methods

3.1 Data collection and estimation methods for individual level data

3.1.1 Criteria for selecting sources of individual level data

The main criteria used for including sources of individual level data on cardiovascular disease or diabetes were as follows:

Time frame

- The data was recorded relatively recently: we gave preference to data collected since 2000. Where several years data were available (e.g. from UK GPRD) we retrieved data from 2000-2007 or 2003-2007, and averaged the data over these years. For total mortality the years from 2003-2006 were combined and averaged for each country.

Study sample

- The reference population was described and corresponded as closely as possible to the national population
- The sampling strategy was as close as possible to random sampling.
- The sample was representative of the reference population.
- The sample size was large (sample size calculation ideally included).
- As wide an age range as possible (from 15 years onwards) was included.
- Data were available by age and gender.
- The level of non-response was ideally documented.
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Validity of the methods

- The methods used to collect data were as free of bias as possible.
- Data were collected at the level of the individual.

- The statistical analysis of the data was appropriate.

Type of information

The following hierarchy of data quality was used to select one source of data for a given country where more than one data source was available:

- Population-based registry
- Large sample survey of good quality
- Small sample survey of good quality
- Survey data on a large sample.

3.1.2 Search strategy for the identification of individual level data

Data on incidence, prevalence of the three diseases, IHD, stroke and NIDDM and 28-day case fatality for IHD and stroke were also identified using a comprehensive search which included computerised databases of published articles, internet search of possible sources of data, and contact with experts in some of the individual countries for their own data.

Computerised databases, library and internet searches

The PubMed database (http://www.ncbi.nlm.nih.gov/sites/entrez) was searched using the free search terms "coronary heart disease [country name]", or "IHD or ischaemic heart disease [country name]" or "stroke" or "diabetes" "type 2 diabetes" "NIDDM" in order to identify relevant surveys and researchers who could be contacted to obtain data or further information about the studies described.

Internet searches (using the Google search engine - http://www.google.com and Google Scholar - http://scholar.google.com/) were also used. The WHO Global health indicators (http://www.who.int/whosis/en/) were also examined for additional sources of information.

The European Health Interview & Health Examination Surveys Database (https://hishes.iph.fgov.be/index.php?hishes=home) developed within the framework of the European Health Survey Information Database (EUHSID) project (4) was also searched by country and type of questions. However, the database did not contain the level of detail required and in addition self-reported data was not considered a reliable source of disease data.

Contacts with experts

Direct contacts were made with experts in the area of cardiovascular disease or diabetes within each country for sources of published or unpublished data on cardiovascular disease and diabetes. Experts were working in either governmental agencies or academic institutions and their contact details available through the EUROCISS website, collaborators in DYNAMO or contacts known by the workpackage leaders.

Contacts were also made with other EU funded projects.

3.1.3 Characteristics of included and excluded individual-level data

Included data

This section describes the general availability and quality of the individual-level data for DYNAMO-HIA. Details of all sources of information reviewed for each country are provided in Annex 1.

Ischaemic heart disease

Individual-level estimates of prevalence, incidence, excess mortality and 28-day case fatality for IHD were obtained for 11 EU countries. Details of the sources of data obtained for each country are described in Table 2. The UK GP research database (GPRD, 16) and the Netherlands GP registry data (17) were the most complete and reliable source of data. Because excess mortality data were not available in all countries except the UK and the Netherlands, the age-sex specific relative risks for mortality from having versus not having the disease were obtained from the UK GPRD and these were applied.

As described above, when data were not available for a given country, data from a neighbouring country with similar risk of disease were used.

Excluded data

Details of the reasons for the exclusion of studies are provided in appendix I. In summary, these included the following:

- Another source of data was used for the country (e.g. more representative sample, better method of data collection, more recent, larger sample size, higher response rate, etc);
- Data were not representative of the population of the country (e.g. only sub-groups or sub-regions of the population were studied);
- Data were not sufficiently recent. All studies used were since year 2000 (e.g. MONICA studies which were from mid 1980s and 1990s).

3.1.4 Characteristics of identified individual level data

Table 2. Details of the studies used to estimate incidence, prevalence, case fatality data for Ischaemic Heart Disease (IHD) in the DYNAMO-HIA project.

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Austria	No data provided							
Belgium	No data provided							
Bulgaria	No data provided							
Czech Rep	No data provided							
Cyprus	No data provided							
Denmark	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*
Estonia	No data provided							
Finland	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*		*M/F*	*16+ years*	*Good*
France	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*
Germany	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*

Greece	No data provided							
Hungary	No data provided							
Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Ireland	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*
Italy	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*
Latvia	No data provided							
Lithuania	No data provided							
Luxembourg	No data provided							
Malta	No data provided							
Netherlands	GP Registries	RIVM website (2003)	GP Registries	ICD codes as above	CMR=12,000 RNH=78,000	MF	0-85+	Good
Poland	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*
Portugal	Personal communication, Ana Avedos, University of Porto	No data provided						
Romania	No data							
Slovakia	No data							

Slovenia	No data							
Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Spain	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*
Sweden	*UK GPRD*	*UK GPRD adjusted for CS mortality*	*UK GPRD adjusted for CS mortality(incidence) IPM prevalence*	*Using READ/OXMIS codes for IHD*	N=2.8million per year	*M/F*	*16+ years*	*Good*
UK	UK GPRD	UK GPRD 2000-2008	National GP registers	Using READ/OXMIS codes for IHD	N=2.8million per year	M/F	16+ years	Good

Italics indicate where data from UK GPRD were substituted for the countries data, as the data provided was not consistent with regard to IPM modelling; CS is cause-specific mortality.

Stroke

Individual-level estimates of prevalence, incidence, excess mortality and 28-day case fatality for stroke were obtained for 24 EU countries. Details of the sources of data obtained for each country are described in Table 3. The main source of data is provided by a systematic review of stroke prevalence and incidence in Europe (9) based on WHO estimates. As this was available for almost all of the 27 countries (the exception were Romania, Estonia and Bulgaria). In addition, the UK GP research database (GPRD, 16) and the Netherlands GP registry data (17) were the most complete and reliable source of data. Because excess mortality data were not available in all countries except the UK and the Netherlands, the age-sex specific relative risks for mortality from having versus not having the disease were obtained from the UK GPRD and these were applied. For consistency of data sources the same source (WHO estimates from the systematic review) of incidence data was used for all countries. IPM was used to calculate the prevalence from incidence, and RRs from the UK GPRD were used in computing excess mortality. Case fatality from the UK GPRD was used for all countries.

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Excluded data

Details of the reasons for the exclusion of studies are provided in Appendix II. In summary, these included the following:

- Another source of data was used for the country (e.g. more representative sample, better method of data collection, more recent, larger sample size, higher response rate, etc);
- Data were not representative of the population of the country (e.g. only sub-groups or sub-regions of the population were studied);
- Data were not sufficiently recent. All studies used were since year 2000.

Table 3. Details of the studies used to estimate incidence, prevalence, case fatality data for Stroke in the DYNAMO-HIA project.

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Austria	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Belgium	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Bulgaria	No data							
Cyprus	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Czech Rep	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Denmark	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Estonia	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Finland	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
France	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Germany	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Greece	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Hungary	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Ireland	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Italy	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Latvia	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Lithuania	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Luxembourg	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Malta	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Netherlands	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Poland	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Portugal	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Romania	No data							

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Slovakia	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Slovenia	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Spain	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
Sweden	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good
UK	WHO estimates	Truelson et al review(2002)	Review for incidence, IPM for prevalence using GPRD RR	WHO stroke definition	44 population based studies from 14 countries	MF	25-85+	Good

Diabetes

Individual-level estimates of prevalence, incidence, and excess mortality for diabetes were obtained for 11 EU countries. Details of the sources of data obtained for each country are described in Table 4 below. In most cases prevalence was obtained and incidence and excess mortality calculated by IPM modelling using the UK GPRD RRs. The UK GP research database (GPRD, 16) and the Netherlands GP registry data (17) were the most complete and reliable source of data. Because excess mortality data were not available in all countries except the UK and the Netherlands, the age-sex specific relative risks for mortality from having versus not having the disease were obtained from the UK GPRD and these were applied. The RRs obtained from the GPRD were adjusted by increasing the value by 50% to obtain internally consistent IPM estimates. It is likely that the true RR may have been underestimated because mortality due to diabetes can be under-reported (18).

Excluded data

Details of the reasons for the exclusion of studies are provided in Appendix IV. In summary, these included the following:

- Another source of data was used for the country (e.g. more representative sample, better method of data collection, more recent, larger sample size, higher response rate, etc);
- Data were not representative of the population of the country (e.g. only sub-groups or sub-regions of the population were studied);
- Data were not sufficiently recent. Most studies used were since 2000

Table 4. Details of the studies used to estimate incidence and prevalence data for NIDDM in the DYNAMO-HIA project.

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Austria	No data							
Belgium	No data							
Bulgaria	No data							
Czech Rep	No data							
Cyprus	No data							
Denmark	National diabetes register	Carstensen et al 2006	National diabetes register for prev and IPM incidence	Diagnosis of diabetes in the NPR, defined as ICD10: DE10-14, DH36.0, DO24 (excluding DO24.4), or ICD8 (prior to 1999): 249, 250 or blood glucose, treatments	N=358,729 in registry	MF	0-110	Good
Estonia	No data							
Finland	Danish National diabetes registry	Carstensen et al 2006	National diabetes register for prev and IPM incidence (using GPRD RR)	AS above	N=358,729 in registry	MF	0-110	Good
France	CNAMTS – projected to 2005	Diabetes & Metabolism 34 (2008) 266–272. Data from 2005	Projected treated diabetes from permanent sample (prev) and IPM (GPRD)	Treated diabetes at least twice per yr	N=70,000	MF	0-90+	Moderate

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Germany	Robert Koch Institute, Bundes-Gesundheits survey (heft 24)	Thefeld W Prävalenz des Diabetes mellitus Gesundheitswesen 61 (Sonderheft 2): S85–S89 (1998)	Survey (prevalence). IPM (GPRD)	Plasma glucose, treatments (prev);	N=7124 (prev);	MF-assume same rates	18-79	Moderate
Greece	No data							
Hungary	No data							
Ireland	Department of Health and Children, HSE-PCRS	Survey Ireland (SLAN) 2007	Face to face interviews, IPM (GPRD)	Self-reported diabetes (prevalence),	N= 10,364 for prevalence	MF	25+years	Moderate
Italy	Testointegral survey 2008 (prev)	Testointegral survey (prev 2008)	Survey for prevalence. IPM (GPRD)	Self-reported diabetes and incident cases from random sample	Prev n=100,000+	MF	Prev 35-75+;	Moderate
Latvia	No data							
Lithuania	No data							
Luxembourg	No data							
Malta	No data							

Country	Data sources	Name of Source (year)	Data collection method for Incidence and prevalence	Definition used	Overall sample size	Sex	Overall age range	Assessment of quality of the data
Netherlands	GP Registers	RIVM, 2003 http://www.rivm nl/vtv/object_document/o1270n17502.html	GP registry for prevalence. IPM for incidence (GPRD RR)	E-code 0919 (NIDDM). From the other registrations: ICPC-codeT90.	CMR=12000 RNH=78000	MF	0-85+	Good
Poland	Polish National health survey	Szybiński Z *Pol Arch Med Wewn 2001 Sep; 106(3):751-8.* (1998-2000)	Self-reported prevalence; IPM for incidence (GPRD)		N=6000	MF		Mod/poor
Portugal	No data							
Romania	No data							
Slovakia	No data							
Slovenia	No data							
Spain	National health survey ; prospective study (N. spain)	Encuesta Nacional De Salud De Espana 2006 (prev).	Survey and IPM for incidence (GPRD)	Survey question.			30-75yr	Moderate
Sweden	Population based admin database	Scandinavian Journal of Public Health, 2007; 35: 424–431 (1999-2003)	Admin database for prevalence; IPM for incidence (GPRD)	ICD-10 codes E10-E14	415,000 persons alive in 2003.	MF	0-85+ years	Good
UK	UK GPRD	UK GPRD (2000-2008)	National GP registries	Read and OXMIS codes, plus prescribing of anti-diabetic meds	N=2.2mill for each yr.	MF	25-85+	Good

3.2 Data collection and estimation methods for prevalence and incidence of IHD, stroke and NIDDM and 28-day case fatality for IHD and stroke.

Estimates of total mortality were obtained from the EHM database (19) for each country for years 2003-2007. The average age-sex specific mortality rate over this period was used. For stroke prevalence and incidence the WHO estimates from the published study by Truelson et al (4) were used in most countries. The only countries not having data provided were Romania, Estonia and Bulgaria. For IHD data from GP registries were available from some countries, for example, the UK and Netherlands. In other cases, data on prevalence were available from Surveys and national cardiovascular registries e.g. in Italy. For diabetes, prevalence data were available from surveys in some countries e.g. Italy, Ireland although the data were self-reported. For incidence data GP registries were used for diabetes e.g. UK and the Netherlands.

3.3 Approach for estimating age and sex specific incidence, prevalence, excess mortality for all diseases

The major limitation to obtaining estimates of disease prevalence is the lack of country-specific data, and the need to extrapolate from existing data. Even when data is available in some countries, it may not be representative of the whole country. Also, data for older age groups are often not available and so assumptions about this age group are required to produce data for this age.

Where data were not available or did not appear consistent (IPM) data from a neighbouring or similar country were assumed. In most cases the data used was from the UK GPRD data which was based on GP registries.

For estimating excess mortality, the age-sex specific relative risk estimates for CVD and diabetes from the UK GPRD were used for most countries, except the Netherlands. This assumes the same relative risk would apply as in the UK, which in some low risk countries e.g. Italy may not be appropriate. However, because few data on excess mortality were available from other countries, this was considered the best way to estimating excess mortality in this case.

3.3.1. Smoothing

All estimates of prevalence, incidence and excess mortality for CVD and diabetes and 28-day case fatality for CVD were based on smoothed value. This allowed for (i) individual age-sex specific estimates of these parameters for each country and (ii) any extrapolation of data beyond the confines of those supplied by the studies etc. In many cases the data were provided by 10-year age bands, and some studies within a narrow age range. Data on the highest age groups (i.e. 65 years and over) tends to be less frequently reported. The smoothing of the estimates was performed using a variety of different models depending on the type of data. For prevalence data, logistic regression analysis was performed, and a linear, quadratic and in some cases cubic age term fitted. For incidence, total mortality, and case fatality data a Poisson regression model was used with linear, quadratic and cubic age terms, according to the best fitting model. Separate smoothing models were provided for males and females separately.

3.3.2. Incidence-Prevalence-Mortality (IPM) modelling: DISMOD

In order to ensure consistent estimates for incidence, prevalence and Excess mortality the IPM model was used. (20) A publication by Hoogeveen provided further details on the methods that had previously been applied to IHD, stroke and diabetes in the Netherlands (21).

Initially the WHO DISMOD (disease model) software was implemented to examine the internally consistent IPM estimates (22). However, after discussions with the co-ordinators of the project and following a meeting 19-21st January 2009 in Rotterdam, it was decided that IPM modelling would be implemented using SAS software (SAS Institute Inc, Cary USA). The equations and methods were written into SAS code (available on request).

The IPM model was used in different ways. Firstly, it was used to estimate excess mortality from age-sex specific incidence and prevalence when excess mortality was not available. The formula used in this instance is as follows:

ExcMort = (Total mortality*(RR-**1**))/((Prevalence-Incidence)*(RR-**1**)+**1**

Age-sex specific relative risks (RR) were provided by the UK GPRD or the Netherlands.

In some cases prevalence was available but not incidence and IPM modelling was used to estimate incidence from prevalence, and excess mortality. Also, prevalence may not have been available but it was possible to estimate prevalence from total mortality, and assuming the excess mortality from the UK GPRD applied.

4 Discussion of the data provided on IHD, Stroke and NIDDM

4.1 Potential sources of uncertainty related to the choice of data sources used

A major source of uncertainty in the final estimates of prevalence, incidence and excess mortality data obtained for DYNAMO-HIA relates to the choice of data sources used, i.e. surveys versus GP registry data, and the assumptions where data are not available i.e. using the UK GPRD estimates of RR for mortality in disease vs non-diseased individuals for calculating excess mortality.

Sources of data on disease prevalence, incidence and case-fatality.

Due the variability in the sources of data available for disease prevalence and incidence etc. the quality of the information on disease will vary across the different countries (Tables 2-4 above). Generally, those estimates based on GP or disease-specific registries will tend to provide more reliable estimates of incidence and prevalence, based on (i) the improved case ascertainment, (ii) large numbers, and (iii) more objective assessments of disease. Prevalence estimates based on self-reported disease from health surveys will lack the external validity and objectivity and may over or under-estimate the true value. They will also depend on the choice and responses provided to the questions on disease.

Some of the data used in the estimates are based on one region of the country, which may not be truly representative of the whole country due to regional, and socio-

economic differences. We have made no adjustments to take these factors into consideration in the present estimates, and assume the same value apply throughout.

4.2 Other potential sources of uncertainty

Although we aimed to obtain individual level prevalence, incidence, case fatality and excess mortality data for every EU country, this was not possible. It may be possible to make extrapolations from some countries to others but this is not provided This may have been an important source of uncertainty, especially in the presence of inter-country heterogeneity. In particular, where data for some countries did not 'fit' with what would be expected or where it was not possible to obtain internally consistent estimates, data from a country that was considered similar in terms of the prevalence of the disease was used. For example, data for IHD from Sweden and Finland were obtained from hospital registers, but the data were not consistent with other similar countries and it was not possible to obtain internally consistent estimates for prevalence and incidence (see figure 1). In this instance, it was decided to substitute the data from the UK GPRD instead. IHD is similar between the UK and these scandinavian countries, particularly Finland, which has ranked in the top 3 countries for IHD mortality alongside the UK and Ireland.

Part 2 Estimating diabetes - CVD relationships

1. General approach for obtaining data on relative risks

The associations provided in this report were based on a comprehensive review of the literature including individual studies and any meta-analysis. This provided evidence for the direction and size of the relationship between diabetes and IHD or stroke separately. Due to the limited time and resources available for this Workpackage, it was not possible to conduct new meta-analyses.

2. Data collection and estimation methods

2.1Criteria for selecting sources of RRs

There are many studies and meta-analyses of studies which have examined the association between differing levels of glucose levels (e,g. fasting glucose at various cut-offs 1, 2) and CVD outcomes. The selection of RRs for DYNAMO-HIA was based on having vs not having diagnosis of NIDDM and IHD or stroke mortality outcomes.

2.2..Search strategy

Computerised databases, library and internet searches

The PubMed database (http://www.ncbi.nlm.nih.gov/sites/entrez) was searched using the free search terms [diabetes, RR CVD mortality, CHD mortality, IHD mortality, stroke mortality] in order to identify relevant studies and researchers who could be contacted to obtain data or further information about the studies described.

Contacts with experts

Contacts were made with experts in the field for references to published or unpublished data sources or for the identification of appropriate contact persons. Experts were defined as contact authors for large epidemiological studies that examined the association between diabetes and the selected outcomes, or authors of meta-analyses in the same field of research. (DECODE authors, UKPDS study, and Prof Simon Capewell and Dr Martin O'Flaherty, Liverpool University, UK and Prof Nigel Unwin and Prof Julia Critchley, Newcastle University, UK).

Studies or meta-analyses were excluded is any one of the following criteria was satisfied:

- The measurement of exposure differed from that used for this project e.g. levels of HbA1c (fasting or otherwise);
- The outcome measures were not CVD mortality;
- The statistical analyses of the study were not adjusted for major confounding factors such as age, sex and smoking.

2.3Characteristics of included & excluded studies of relative risks

IHD mortality

Several studies have examined the association between diabetes and CVD mortality outcomes. More recently a large meta-analysis was conducted by Huxley et al (3). This meta-analysis was based on 37 prospective studies with multiple adjusted coefficients. However, the data in the published paper was not presented age groups and only provided gender specific RRs (F RR=3.12, 95% CI 2.34, 4.17; M RR= 1.99, 95% CI 1.69, 2.35). The authors were written to in order to obtain the age-specific RRs, but no response was received. An earlier study by Kanaya et al (4) was based on only 8 studies with multivariate adjustment, and showed similar results to that by Huxley, but no age-specific data provided (F RR=2.9 , 95% CI 2.2, 3.8 ;M RR= 2.3, 95% CI 1.9,2.8).

Due to the lack of age-specific RRs from these meta-analyses and in consultation with Prof Simon Capewell and colleagues at Liverpool University, UK, we decided to use the RRs from the INTERHEART study (5) which are based on a large number of case-control studies performed in 52 different countries. Gender-age specific RRs are provided in Table 5 below.

Studies considered but not included

The DECODE (the Diabetes Epidemiology: Collaborative Analysis of Diagnostic Criteria in Europe) study, initially from 13 centres around Europe (6). One of the authors of the study was contacted directly and RRs were obtained. However, the RRs appeared to considerably higher than other published studies above, and so were not considered further. (thank Dr Qiao et al for supplying these data)

Another study considered was a large study by Vibergsson et al (7), with multivariate adjustment for age, many CVD risk factors and calendar year. The results were found

to be similar to those described above but this was an older study. The study by Manson et al (8) only provided data for women 30-55 yrs and another by Almdal T et al (9) was based on the Copenhagen Heart study, but outcome was total mortality.

Age-gender group	**RR**
Men <=55 years	2.66
Men > 55 years	1.93
Women <=65 years	3.53
Women >65 years	2.59

Table 5: RR for diabetes association with IHD mortality

Stroke mortality

Two studies were considered for inclusion in the RR for stroke mortality and diabetes, because they provided the range of ages required. The first by Barrett-Connor E et al (10) was used for those under 50 yrs and the second by Gu K, et al (11) for those aged over 50 year. The results are provided in table 6 below.

Studies considered but not included

As above the DECODE study was considered (6) and the author Dr Qiao provided the necessary data on RRs by gender and age groups adjusted for Cholesterol, SBP, smoking and BMI (personal communication Dr Qiao.) . Although the data were more detailed than those provided they were not considered further as the RRs appeared much higher than other published studies.

Two further studies by Stegmayr B et al (12) and Jaakko Tuomilehto et al (13) were small studies with large RRs and were not considered further.

Age-gender group	**RR**
Men <=50 years	2.0
Men > 50 years	1.80
Women <=50 years	2.90
Women >50 years	2.20

Table 6: RR for diabetes association with stroke mortality

The same RR were used for all countries, hence comparability is not an issue here.

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Part 1

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6. http://www.euhsid.org/ (Health Surveys in the EU: HIS and HIS/HES evaluations and models')
7. http://www.share-project.org/
8.http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/European_health_interview_survey_(EHIS)
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12. www.euphix.org

13. IDF Diabetes Atlas. 2002

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Appendix I

ECHIM indicators for diabetes, stroke and Ischaemic Heart Disease

24.3.2009

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	Hospital-data project: http://ec.europa.eu/health/ph_projects/2000/monitoring/fp_monitoring_2000_frep_09_en.pdf http://ec.europa.eu/health/ph_projects/2004/action1/action1_2004_full_en.htm#4 EPIC ELDERLY NAH: http://www.nut.uoa.gr/english/EpicElderlyNAH/Epic_Elderly_Nah.htm) - EHIS standard questionnaire (version of 11/2006): http://ec.europa.eu/health/ph_information/implement/wp/systems/docs/ev_20070315_ehis_en.pdf
Work to do	•

Appendix II

Details of the IHD data identified by country: sources considered

Denmark

Danish National Health Survey
OLA EKHOLM, ULRIK HESSE, MICHAEL DAVIDSEN & METTE KJØLLER The study design and characteristics of the Danish national health interview surveys - Scandinavian Journal of Public Health, 2009; 0: 1–8 – not used based on health survey.

MERETE OSLER, THORKILD I A S0RENSEN, SVEND S0RENSEN, KLAUS ROSTGAARD, GORM JENSEN, LARS IVERSEN, TAGE S KRISTENSEN AND METTE MADSEN Trends in Mortality, Incidence and Case Fatality of Ischaemic Heart Disease in Denmark, 1982-1992. Int J Epi 1996; 25: - not used as old data.

SHARE 2004, 2006-2007: Study of Health, Aging, and Retirement in Europe – more recent data but based on survey questions and only in over 55 year population.

Hospital discharge data available – but not considered representative of all cases.

Monica study 1982/93 for Denmark (only 35-64 yrs) gives the rate of first and recurrent events (fatal and non-fatal) from one region 0.00517 in men and 0.00140 in females. – data too old.

Finland

Health 2000 Survey

- Survey coordinated by the KTL with data collected form the fall of 2000 to the spring of 2001.
- Aromaa A, Koskinen S, ed. Health and functional capacity in Finland. Baseline results of the Health 2000 Health Examination Survey. Helsinki: National Public Health Institute, 2004. Available at http://www.terveys2000.fi/publications.html, last visited 10 July 2009. – survey data not considered.

A Menotti,M Lanti, P E Puddu, D Kromhout. Coronary heart disease incidence in northern and southern European populations: a reanalysis of the seven countries study for a European coronary risk chart. *Heart* 2000;84;238-244 – very old data.

Finnish CVD disease register (http://www3.ktl.fi/stat/) – not suitable as based on hospital discharge only.

France

- Marques-Vidal P, Ruidavets JB, Cambou JP, Ferrières J. Incidence, recurrence, and case fatality rates for myocardial infarction in southwestern France, 1985 to 1993. Heart. 2000 Aug;84(2):171-5. – one region and old data.

- Lang T, Ducimetière P, Arveiler D, Amouyel P, Cambou JP, Ruidavets JB, Montaye, M, Meyer V, Bingham A. Incidence, case fatality, risk factors of acute coronary heart disease and occupational categories in men aged 30-59 in France. Int J Epidemiol. 1997 Feb;26(1):47-57. - MONICA study considered too old.

PRIME study – Prospective Epidemiological Study of Myocardial Infarction

- Established in 1991 in the populations of four collaborating centers of Belfast (United Kingdom), Lille, Strasbourg, and Toulouse (France). Ducimetière P, Ruidavets JB, Montaye M, Haas B, Yarnell J; PRIME Study Group. Five-year incidence of angina pectoris and other forms of coronary heart disease in healthy men aged 50-59 in France and Northern Ireland: the Prospective Epidemiological Study of Myocardial Infarction (PRIME) Study. Int J Epidemiol. 2001 Oct;30(5):1057-62
- Not selected as conducted only in selected cities, only in men, and limited age range

SHARE 2004 and SHARE 2006-2007: Study of Health, Aging, and Retirement in Europe – not considered as survey data in a select population.

D. Cottel, J. Dallongeville, A. Wagner, J. B. Ruidavets, D. Arveiler, J. Ferrieres, A. Bingham, N. Marecaux, P. Ducimetiere, P. Amouyel. The North-East-South Gradient of Coronary Heart Disease Mortality and Case Fatality Rates in France Is Consistent with a Similar Gradient in Risk Factor Clusters. European Journal of Epidemiology, 2000; 16: 317-322. Not considered data to old.

Bulletin epidemiologique hebdomadaire. Numéro thématique Surveillance de la pathologie coronaire en France : l'après *MONICA* No 8-9. RÉPUBLIQUE FRANÇAISE Feb 2006. Data were considered, but a different approach for IHD used instead.

Germany

Bundes-Gesundheitssurvey: conducted by the Robert Koch Institute (RKI)

- Representative sample of the resident population
- N=7124 individuals aged 18-79 years; Response rate=61.4%
- Survey data were collected by means of self-administered questionnaire, medical interview and physical examination. Data were considered, but a different approach for IHD used instead.

Keil U, Filipiak B, Döring A, Hense HW, Lewis M, Löwel H, Steiber J; Centers for Disease Control (CDC). Monitoring trends and determinants in cardiovascular disease in Germany: results of the MONICA Project Augsburg, 1985-1990. MMWR Morb Mortal Wkly Rep. 1992 Dec;41 Suppl:171-9. – Data too old.

Helmert U, Herman B, Joeckel KH, Greiser E, Madans J. Social class and risk factors for coronary heart disease in the Federal Republic of Germany. Results of the baseline survey of the German Cardiovascular Prevention Study (GCP). J Epidemiol Community Health. 1989 Mar;43(1):37-42 – data too old.

SHARE 2004 and 2006-2007: Study of Health, Aging, and Retirement in Europe – A survey in a subset of the population.

Ireland

Survey of Lifestyles, Attitudes and Nutrition in Ireland (SLAN) 2007 (Also conducted in 1998, 2002). Data were considered, but a different approach for IHD used instead.

Morgan K, McGee H, Watson D, Perry I, Barry M, Shelley E, Harrington J, Molcho M, Layte R, Tully N, van Lente E, Ward M, Lutomski J, Conroy R, Brugha R. SLÁN 2007: Survey of lifestyle, attitudes & nutrition in Ireland. Main report. Dublin: Department of Health and Children, 2008.

- Conducted in 2007.
- National survey representative of general population of Ireland (when compared with Census 2006 figures) and weighted in the analysis to match Census data.
- N=10,364 respondents; Response rate = 62%.
- Data were collected by personal interviews.

Italy

Attack rates and case fatality of coronary events in Italy for men and women, 1998-1999, ages 35-74 years (Italian Heart Journal 2006;6:667) . Data were considered, but a different approach for IHD used instead.

Giampaoli S, Menotti A, Cannatelli P, Cesana GC, Ferrario M, Forte E, Maietta A, Righetti G. Mortality and coronary events in two Italian MONICA areas: area Latina and area Brianza. Acta Med Scand Suppl. 1988;728:67-72. – data too old.

ISTITUTO NAZIONALE DI STATISTICA Compendio statistico italiano Italian Statistical Abstract 2008 – National statistics for Italy, but not detailed enough.

Health interview survey in 35-74 yrs at http://www.epicentro.iss.it/ (OEC survey). Not considered as a health survey.

Netherlands

RIVM registry data were considered, but a different approach for IHD used instead.

Incidence and prevalence rate data from GP registries were obtained from the Dutch National Institute of Public Health website (www.rivm.nl). The links to the web pages on the RIVM website from which the data were downloaded for each disease are as follows: http://www.rivm.nl/vtv/object_document/o1320n17964.html

Merry AH, Boer JM, Schouten LJ, Feskens EJ, Verschuren WM, Gorgels AP, van den Brandt PA. Validity of coronary heart diseases and heart failure based on hospital discharge and mortality data in the Netherlands using the cardiovascular registry Maastricht cohort study. Eur J Epidemiol. 2009;24(5):237-47. – not considered.

Poland

Grayna Broda, M.D., Stefan Rywik, M.D., Pawel Kurjata, M.D. Trends in Myocardial Infarction Incidence and Fatality in Warsaw PoI-MONICA Population from 1984 to 1988 International Journal of Angiology 4:113-116 (1995) – Old data.

Health interview survey 1996 - http://www.stat.gov.pl/gus/45_1966_ENG_HTML.htm; self-reported data and quite old.

- Piwońska A, Piotrowski W, Broda G. Ten-year risk of fatal cardiovascular disease in the Polish population and medical care. Results of the WOBASZ study. Kardiol Pol. 2010 Jun;68(6):672-7. A sample of the Polish population including 6392 men and 7153 women aged 20-74 years – not considered as a different approach for IHD used instead.

Spain

Encuesta National de Salud (Spanish National Health Survey: SNHS) 2006 (Also: 1995, 2001, 2003) - Conducted by the INE (Instituto Nacionalde Estadistica). Instituto Nactionalde Estadistica. Press Release: 'National Health Survey, Year 2006'. 13 March 2008. Available at: http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft15/p419&file=inebase&L=1%20%20-

- Data collection from June 2006-June 2007
- Nation-wide survey of households
- A stratified tri-stage sample type is used. The first-stage units are the census sections. The second-stage units are the main family dwellings. One adult (aged 16 and over) is selected within each household to fill out the Adults Questionnaire and, should there be any minors (aged 0 through 15), a minor is also selected to fill out the Minors Questionnaire.
- Sample: approximately 31,300 households distributed among 2,236 census sections. Data were considered, but a different approach for IHD used instead.

Gil M, Martí H, Elosúa R, Grau M, Sala J, Masiá R, Pérez G, Roset P, Bielsa O, Vila J, Marrugat J. [Analysis of trends in myocardial infarction case-fatality, incidence and mortality rates in Girona, Spain, 1990-1999]. Rev Esp Cardiol. 2007 Apr;60(4):349-56. Spanish – Regicor study. Only in one area of Spain based on MONICA criteria.

Sans S, Puigdefábregas A, Paluzie G, Monterde D, Balaguer-Vintró I. Increasing trends of acute myocardial infarction in Spain: the MONICA-Catalonia Study. Eur Heart J. 2005 Mar;26(5):505-15. MONICA study data not recent.

Sweden

Lundblad D, Holmgren L, Jansson JH, Näslund U, Eliasson M. Gender differences in trends of acute myocardial infarction events: the Northern Sweden MONICA study 1985 - 2004. BMC Cardiovasc Disord. 2008 Jul 25;8:17.
Messner T, Lundberg V, Boström S, Huhtasaari F, Wikström B. Trends in event rates of first and recurrent, fatal and non-fatal acute myocardial infarction,

and 28-day case fatality in the Northern Sweden MONICA area 1985-98. Scand J Public Health Suppl. 2003;61:51-9. – MONICA data too old.
Hammar N, Alfredsson L, Rosén M, Spetz CL, Kahan T, Ysberg AS. A national record linkage to study acute myocardial infarction incidence and case fatality in Sweden. Int J Epidemiol. 2001 Oct;30 Suppl 1:S30-4 – data quite old.

Swedish survey of living conditions (ULF). http://www.scb.se/default____2154.aspx. Survey data not considered for IHD.

Data made available by Prof Rosengren, Gotborg University. – Data considered but a different approach was used for IHD.

United Kingdom

UK GPRD – www.gprd.com – used in the DYNAMO model.

Health Survey for England, 2006 and Scottish Health survey, 2003 (IHD Incidence

Quality of Outcomes Framework
Coronary Heart Disease Statistics, 2008 (www.heartstats.org)

IHD case fatality

- Volmink JA, Newton JN, Hicks NR, Sleight P, Fowler GH, Neil HA. Coronary event and case fatality rates in an English population: results of the Oxford myocardial infarction incidence study. The Oxford Myocardial Infarction Incidence Study Group. Heart. 1998 Jul;80(1):40-4., 1998
- Norris et al, 1998;
- MONICA Belfast & Glasgow studies;
- British Regional Heart Study, 1978-1980

Appendix III

Details of the stroke data identified by country: sources considered

Denmark

Danish National Health Survey
OLA EKHOLM, ULRIK HESSE, MICHAEL DAVIDSEN & METTE KJØLLER
The study design and characteristics of the Danish national health interview surveys - Scandinavian Journal of Public Health, 2009; 0: 1–8

Truelsen, T; Prescott, E; Gronbaek, M; Schnohr, P; Boysen, G. The Copenhagen City Heart Study Stroke. 28(10):1903-1907, October 1997.

Per Thorvaldsen, Michael Davidsen, Henrik Brønnum-Hansen and Marianne Schroll Stable Stroke Occurrence Despite Incidence Reduction in an Aging Population : Stroke Trends in the Danish Monitoring Trends and Determinants in Cardiovascular Disease (MONICA) Population *Stroke* 1999;30;2529-2534

Finland

Health 2000 Survey

- Survey coordinated by the KTL with data collected form the fall of 2000 to the spring of 2001.
- Aromaa A, Koskinen S, ed. Health and functional capacity in Finland. Baseline results of the Health 2000 Health Examination Survey. Helsinki: National Public Health Institute, 2004. Available at http://www.terveys2000.fi/publications.html, last visited 10 July 2009

Finnish CVD disease register (http://www3.ktl.fi/stat/) – not suitable as based on hospital discharge only.

France

Benatru, Rouaud, Durier, Contegal, Couvreur, Bejot, Osseby, Ben Salem, Ricolfi, Moreau, Giroud. Stable Stroke Incidence Rates but Improved Case-Fatality in Dijon, France, from 1985 to 2004. *Stroke* 2006;37;1674-1679;

Bejot Y, Giroud M, Rouaud O, Benatru I, Moreau T, Freycz M, Osseby GV; Trends in stroke incidence and case-fatality rates over a 20-year period (1985-2004) in Dijon, France. Bull Acad Natl Med. 2007 Feb;191(2):305-22

Bejot Y, Rouaud O, Durier J, et al Decrease in the stroke case fatality rates in a

French population-based twenty-year study. A comparison between men and women.

Germany

Bundes-Gesundheitssurvey: conducted by the Robert Koch Institute (RKI)

- Representative sample of the resident population
- N=7124 individuals aged 18-79 years; Response rate=61.4%
- Survey data were collected by means of self-administered questionnaire, medical interview and physical examination.

L.A.J.Heinemann · W. Barth1 · E.Garbe · S.N.Willich · K.Kunze und die Forschungsgruppe MONICA Ostdeutschland. Epidemiologische Daten zur Schlaganfallerkrankung Daten des WHO-MONICA-Projekts in Deutschland. Nervenarzt 1998 · 69: 1091–1099

Rathmann W, Haastert B, Icks A, Löwel H, Meisinger C, Holle R, Giani G. High prevalence of undiagnosed diabetes mellitus in Southern Germany: target populations for efficient screening. The KORA survey 2000. Diabetologia. 2003 Feb;46(2):182-9.

SHARE 2004 and 2006-2007: Study of Health, Aging, and Retirement in Europe.

Kolominsky-Rabas PL, Heuschmann PU, Marschall D, Emmert M, Baltzer N, Neundörfer B, Schöffski O, Krobot KJ. Lifetime cost of ischemic stroke in Germany: results and national projections from a population-based stroke registry: the Erlangen Stroke Project. Stroke. 2006 May;37(5):1179-83

Ireland

Survey of Lifestyles, Attitudes and Nutrition in Ireland (SLAN) 2007 (Also conducted in 1998, 2002)

Morgan K, McGee H, Watson D, Perry I, Barry M, Shelley E, Harrington J, Molcho M, Layte R, Tully N, van Lente E, Ward M, Lutomski J, Conroy R, Brugha R. SLÁN 2007: Survey of lifestyle, attitudes & nutrition in Ireland. Main report. Dublin: Department of Health and Children, 2008.

- Conducted in 2007.
- National survey representative of general population of Ireland (when compared with Census 2006 figures) and weighted in the analysis to match Census data.
- N=10,364 respondents; Response rate = 62%.
- Data were collected by personal interviews.

Italy

ISTITUTO NAZIONALE DI STATISTICA Compendio statistico italiano Italian Statistical Abstract 2008 – National statistics for Italy.

Palmieri L, Barchielli A, Cesana G, de Campora E, Goldoni CA, Spolaore P, Uguccioni M, Vancheri F, Vanuzzo D, Ciccarelli P, Giampaoli S; Research Group of the Project 'Italian National Register of Coronary and Cerebrovascular Events'. The Italian register of cardiovascular diseases: attack rates and case fatality for cerebrovascular events. Cerebrovasc Dis. 2007;24(6):530-9.

Giampaoli S, Menotti A, Cannatelli P, Cesana GC, Ferrario M, Forte E, Maietta A, Righetti G. Mortality and coronary events in two Italian MONICA areas: area Latina and area Brianza. Acta Med Scand Suppl. 1988;728:67-72. – data too old.

Health interview survey in 35-74 yrs at http://www.epicentro.iss.it/ (OEC survey)

Netherlands

Incidence and prevalence rate data from GP registries were obtained from the Dutch National Institute of Public Health website (www.rivm.nl). The links to the web pages on the RIVM website from which the data were downloaded for each disease are as

Stroke: http://www.rivm.nl/vtv/object_document/o1027n17966.html

Poland

Sowik , Turaj , Zwolińska , Róg , Dziedzic , Pera , Rudzińska , Wyrwicz-Petkow , Kasprzyk, Kietyka, Pajk, Szczudlik. Stroke attack rates and case fatality in the Krakow Stroke Registry. Neurologia i Neurochirurgia Polska 2007; 41, 4: 291–295

Czlonkowska A, Ryglewicz D, Weissbein T, Baranska-Gieruszczak M, Hier DB. A prospective community-based study of stroke in Warsaw, Poland. Stroke. 1994 Mar;25(3):547-51.

Spain

Encuesta National de Salud (Spanish National Health Survey: SNHS) 2006 (Also: 1995, 2001, 2003)

Conducted by the INE (Instituto Nacionalde Estadistica). Instituto Nactionalde Estadistica. Press Release: 'National Health Survey, Year 2006'. 13 March 2008. Available at: http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft15/p419&file=inebase&L=1%20%20-

- Data collection from June 2006-June 2007
- Nation-wide survey of households
- A stratified tri-stage sample type is used. The first-stage units are the census sections. The second-stage units are the main family dwellings. One adult (aged 16 and over) is selected within each household to fill out the Adults Questionnaire and, should there be any minors (aged 0 through 15), a minor is also selected to fill out the Minors Questionnaire.
- Sample: approximately 31,300 households distributed among 2,236 census sections.

Marrugat J, Arboix A, García-Eroles L, Salas T, Vila J, Castell C, Tresserras R, Elosua R. [The estimated incidence and case fatality rate of ischemic and hemorrhagic cerebrovascular disease in 2002 in Catalonia]. Rev Esp Cardiol. 2007 Jun;60(6):573-80. Spanish. – Only in one region of spain.

Alzamora MT, Sorribes M, Heras A, Vila N, Vicheto M, Forés R, Sánchez-Ojanguren J, Sancho A; "ISISCOG Study Group", Pera G. Ischemic stroke incidence in Santa Coloma de Gramenet (ISISCOG), Spain. A community-based study. BMC Neurol. 2008 Mar 27;8:5.

Modrego PJ, Pina MA, Lerín FJ. The impact of ageing on stroke subtypes, length of stay and mortality: study in the province of Teruel, Spain. Acta Neurol Scand. 2003 Dec;108(6):435-42. For case-fatality of stroke.

Boix R, del Barrio JL, Saz P, Reñé R, Manubens JM, Lobo A, Gascón J, de Arce

A, Díaz-Guzmán J, Bergareche A, Bermejo-Pareja F, de Pedro-Cuesta J; Spanish Epidemiological Study Group on Ageing. Stroke prevalence among the Spanish elderly: an analysis based on screening surveys. BMC Neurol. 2006 Oct 16;6:36. Study in 7 regions of spain.

Vega T, Zurriaga O, Ramos JM, Gil M, Alamo R, Lozano JE, López A, Miralles MT, Vaca P, Alvarez Mdel M; Group of research for the RECENT project. Stroke in Spain: epidemiologic incidence and patterns; a health sentinel network study. J Stroke Cerebrovasc Dis. 2009 Jan;18(1):11-6.

Sweden

Pessah-Rasmussen H, Engström G, Jerntorp I, Janzon L. Increasing stroke incidence and decreasing case fatality, 1989-1998: a study from the stroke register in Malmö, Sweden. Stroke. 2003 Apr;34(4):913-8.

Data made available by Prof Rosengren, Gotborg University. – Data considered but a different approach was used for Stroke.

The Swedish survey of living conditions (ULF).
http://www.scb.se/default____2154.aspx. Survey data not considered for IHD.

United Kingdom

UK GPRD – www.gprd.com – used in the DYNAMO model.

Health Survey for England, 2006 and Scottish Health survey, 2003 (IHD Incidence

Quality of Outcomes Framework

Stroke Incidence and Prevalence in Europe: a review of available data (Truelsen et al, 2006)
Scottish Borders 1998-2000 (Syme PD, Byrne AW, Chen R, Devenny R, Forbes JF. Community-based stroke incidence in a Scottish population: the Scottish Borders Stroke Study. Stroke. 2005 Sep;36(9):1837-43.
Stroke case fatality (2001 National Sentinel Audit of Stroke, England, Wales & Northern Ireland (Rudd et al, 2005; Oxford Vascular Study (Rothwell et al, 2005))

Appendix IV

Details of the diabetes data identified by country: sources considered

Denmark

Danish National Health Survey
OLA EKHOLM, ULRIK HESSE, MICHAEL DAVIDSEN & METTE KJØLLER
The study design and characteristics of the Danish national health interview surveys - Scandinavian Journal of Public Health, 2009; 0: 1–8

A. Green . H. Støvring . M. Andersen . H. Beck-Nielsen. The epidemic of type 2 diabetes is a statistical artefact. Diabetologia. 2005 48: 1456–1458.

B. Carstensen & J. K. Kristensen & P. Ottosen & K. Borch-Johnsen & on behalf of the steering group of the National Diabetes Register The Danish National Diabetes Register: trends in incidence, prevalence and mortality. Diabetologia. 2008 51:2187–2196

Finland

Health 2000 Survey

- Survey coordinated by the KTL with data collected form the fall of 2000 to the spring of 2001.
- Aromaa A, Koskinen S, ed. Health and functional capacity in Finland. Baseline results of the Health 2000 Health Examination Survey. Helsinki: National Public Health Institute, 2004. Available at http://www.terveys2000.fi/publications.html, last visited 10 July 2009

Diabetes federation produced a report with age-sex specific prevalence data for 2002.

Marja Niemi, Klas Winell Diabetes in Finland: Prevalence and Variation in Quality of Care. Finnish Diabetes Association. STAKES – National Research and Development Centre for Welfare and Health. 2006

Reunanen A, Kangas T, Martikainen J, Klaukka T. Nationwide survey of comorbidity, use, and costs of all medications in Finnish diabetic individuals. Diabetes Care. 2000 Sep;23(9):1265-71. PubMed PMID: 10977017

Ylihärsilä H, Lindström J, Eriksson JG, Jousilahti P, Valle TT, Sundvall J, Tuomilehto J. Prevalence of diabetes and impaired glucose regulation in 45- to 64-year-old individuals in three areas of Finland. Diabet Med. 2005 Jan;22(1):88-91. PubMed PMID: 15606697.

France

- Kusnik-Joinville O, Weill A, Salanave B, Ricordeau P, Allemand H. Prevalence and treatment of diabetes in France: trends between 2000 and 2005. Diabetes Metab. 2008 Jun;34(3):266-72.

Auleley GR, Dematons MN, Berchery P, Raynal-Minville F, Suarez F, Heuls-Bernin B, Blum-Boisgard C. Type 2 diabetes mellitus among beneficiaries of the french national health insurance for self-employed workers (AMPI): comparison of the management of craftsmen or tradesmen with professionals patients. Diabetes Metab. 2002 Dec;28(6 Pt 1):491-8

Passa P. Diabetes trends in Europe. Diabetes Metab Res Rev. 2002 Sep-Oct;18 Suppl 3:S3-8. Review.

Ricordeau P, Weill A, Vallier N, Bourrel R, Schwartz D, Guilhot J, Fender P, Allemand H. The prevalence and cost of diabetes in metropolitan France: what trends between 1998 and 2000?. Diabetes Metab. 2003 Nov;29(5):497-504

Chronic Diseases: the French Diabetes Management Program *sophia*
C. Bismuth. French Health Insurance Fund for employees (CNAMTS), France

HIS (ESPS) Biannual survey – IRDES/ CNAMTS - National Health Insurance Fund for Salaried Workers (statistics department).

SURVEY'S FOCUS - Self perceived health status, Public coverage and private supplementary health insurance, Visits to a physician, Consumption of medical goods and services, Hospitalization

SHARE 2004 and SHARE 2006-2007: Study of Health, Aging, and Retirement in Europe

Germany

Bundes-Gesundheitssurvey: conducted by the Robert Koch Institute (RKI)

- Representative sample of the resident population
- N=7124 individuals aged 18-79 years; Response rate=61.4%
- Survey data were collected by means of self-administered questionnaire, medical interview and physical examination.

SHARE 2004 and 2006-2007: Study of Health, Aging, and Retirement in Europe

Meisinger C, Döring A, Heier M, Thorand B, Löwel H; MONICA/KORA Study Group. Type 2 diabetes mellitus in Augsburg--an epidemiological overview. Gesundheitswesen. 2005 Aug;67 Suppl 1:S103-9.

Stock SA, Redaelli M, Wendland G, Civello D, Lauterbach KW. Diabetes--prevalence and cost of illness in Germany: a study evaluating data from the statutory health insurance in Germany. Diabet Med. 2006 Mar;23(3):299-305.

Rathmann W, Strassburger K, Heier M, Holle R, Thorand B, Giani G, Meisinger C. Incidence of Type 2 diabetes in the elderly German population and the effect of clinical and lifestyle risk factors: KORA S4/F4 cohort study. Diabet Med. 2009 Dec;26(12):1212-9.

Ireland

Survey of Lifestyles, Attitudes and Nutrition in Ireland (SLAN) 2007 (Also conducted in 1998, 2002)

Morgan K, McGee H, Watson D, Perry I, Barry M, Shelley E, Harrington J, Molcho M, Layte R, Tully N, van Lente E, Ward M, Lutomski J, Conroy R, Brugha R. SLÁN 2007: Survey of lifestyle, attitudes & nutrition in Ireland. Main report. Dublin: Department of Health and Children, 2008.

- Conducted in 2007.
- National survey representative of general population of Ireland (when compared with Census 2006 figures) and weighted in the analysis to match Census data.
- N=10,364 respondents; Response rate = 62%.
- Data were collected by personal interviews.

Italy

ISTITUTO NAZIONALE DI STATISTICA Compendio statistico italiano Italian Statistical Abstract 2008 – National statistics for Italy.

Bruno G, Runzo C, Cavallo-Perin P, Merletti F, Rivetti M, Pinach S, Novelli G, Trovati M, Cerutti F, Pagano G; Piedmont Study Group for Diabetes Epidemiology. Incidence of type 1 and type 2 diabetes in adults aged 30-49 years: the population-based registry in the province of Turin, Italy. Diabetes Care. 2005 Nov;28(11):2613-9. – In one area of Italy and quite old data 1999 and narrow age range.

Gnavi R, Karaghiosoff L, Balzi D, Barchielli A, Canova C, Demaria M, Pellizzari M, Rigon S, Tessari R, Simonato L. [Diabetes prevalence estimated using a standard algorithm based on electronic health data in various areas of Italy]. Epidemiol Prev. 2008 May-Jun;32(3 Suppl):15-21. Italian

Health interview survey in 35-74 yrs at http://www.epicentro.iss.it/ (OEC survey)

Netherlands

Incidence and prevalence rate data from GP registries were obtained from the Dutch National Institute of Public Health website (www.rivm.nl). The links to the web pages on the RIVM website from which the data were downloaded for each disease are as follows:

Diabetes: http://www.rivm.nl/vtv/object_document/o1270n17502.html

L. J. Ubink-Veltmaat, H. J. G. Bilo, K. H. Groenier, S. T. Houweling, R. O. Rischen, B. Meyboom-de Jong Prevalence, Incidence and Mortality of Type 2 Diabetes Mellitus Revisited: A Prospective Population-Based Study in The Netherlands (ZODIAC-1) European Journal of Epidemiology, Vol. 18, No. 8 (2003), pp. 793-800

Mooy JM, Grootenhuis PA, de Vries H, Valkenburg HA, Bouter LM, Kostense PJ, Heine RJ. Prevalence and determinants of glucose intolerance in a Dutch Caucasian population. The Hoorn Study. Diabetes Care. 1995 Sep;18(9):1270-3. – in 50-74 year olds

Poland

Kissimova-Skarbek K, Pach D, Płaczkiewicz E, Szurkowska M, Szybiński Z. [Evaluation of the burden of diabetes in Poland] Pol Arch Med Wewn. 2001 Sep;106(3):867-73. [Article in Polish] – more related to costs associated with diabetes.

Health interview survey 1996 - http://www.stat.gov.pl/gus/45_1966_ENG_HTML.htm; self-reported data and quite old.

Szybiński Z. [Polish Multicenter Study on Diabetes Epidemiology (PMSDE)--1998-2000] Pol Arch Med Wewn. 2001 Sep;106(3):751-8.[Article in Polish]

Szurkowska M, Szybiński Z, Nazim A, Szafraniec K, Jedrychowski W. [Prevalence of type II diabetes mellitus in population of Krakow] Pol Arch Med Wewn. 2001 Sep;106(3):771-9. [Article in Polish]

Spain

Encuesta National de Salud (Spanish National Health Survey: SNHS) 2006 (Also: 1995, 2001, 2003)

Conducted by the INE (Instituto Nacionalde Estadistica). Instituto Nactionalde Estadistica. Press Release: 'National Health Survey, Year 2006'. 13 March 2008. Available at: http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft15/p419&file=inebase&L=1%20%20-

- Data collection from June 2006-June 2007
- Nation-wide survey of households
- A stratified tri-stage sample type is used. The first-stage units are the census sections. The second-stage units are the main family dwellings. One adult (aged 16 and over) is selected within each household to fill out the Adults Questionnaire and, should there be any minors (aged 0 through 15), a minor is also selected to fill out the Minors Questionnaire.
- Sample: approximately 31,300 households distributed among 2,236 census sections.

Masiá R, Sala J, Rohlfs I, Piulats R, Manresa JM, Marrugat J; Investigadores del estudio REGICOR. [Prevalence of diabetes mellitus in the province of Girona, Spain: the REGICOR study]. Rev Esp Cardiol. 2004 Mar;57(3):261-4. Spanish

Soriguer F, Rojo-Martínez G, Almaraz MC, Esteva I, Ruiz de Adana MS, Morcillo S, Valdés S, García-Fuentes E, García-Escobar E, Cardona I, Gomez-Zumaquero JM, Olveira-Fuster G. Incidence of type 2 diabetes in southern Spain (Pizarra Study). Eur J Clin Invest. 2008 Feb;38(2):126-33.

Valdés S, Botas P, Delgado E, Alvarez F, Cadórniga FD. Population-based incidence of type 2 diabetes in northern Spain: the Asturias Study. Diabetes Care. 2007 Sep;30(9):2258-63.

Sweden

(http://www.scb.se), but self-reported. May be used for comparison only

Eliasson M, Lindahl B, Lundberg V, Stegmayr B. No increase in the prevalence of known diabetes between 1986 and 1999 in subjects 25-64 years of age in northern Sweden. Diabet Med. 2002 Oct;19(10):874-80.

Thunander M, Petersson C, Jonzon K, Fornander J, Ossiansson B, Torn C, Edvardsson S, Landin-Olsson M. Incidence of type 1 and type 2 diabetes in adults and children in Kronoberg, Sweden. Diabetes Res Clin Pract. 2008 Nov;82(2):247-55.

Ann-Britt E. Wiréhn ab; H. Mikael Karlsson c; John M. CarstensenScandinavian Estimating disease prevalence using a population-based administrative healthcare database. Journal of Public Health, 2007; 35: 424–431

Berger B, Stenström G, Sundkvist G. Incidence, prevalence, and mortality of diabetes in a large population. A report from the Skaraborg Diabetes Registry. Diabetes Care. 1999 May;22(5):773-8.

Mats Eliasson; Gunnel Boström Chapter 5.2: Major public health problems – diabetes. Scandinavian Journal of Public Health, 2006; 34(Suppl 67): 59–68.

Wiréhn AB, Karlsson HM, Carstensen JM. Estimating disease prevalence using a population-based administrative healthcare database. Scand J Public Health. 2007;35(4):424-31

United Kingdom

UK GPRD – www.gprd.com – used in the DYNAMO model.

Health Survey for England, 2006 and Scottish Health survey, 2003
Quality of Outcomes Framework
National Diabetes Audit (2005/6)
Diabetes Atlas, 3rd Ed
Diabetic Audit and Research in Tayside, Scotland (DARTS) register (McAlpine et al, 2005)

Q Research -
http://www.qresearch.org/Public_Documents/DataValidation/Diabetes%20in%20the%20UK%20analysis%20of%20QRESEARCH%20data.pdf