Assessing knowledge about cardiovascular disease and stroke: A literature review

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Summary

This literature review covers research on public awareness of cardiovascular disease (CVD) and stroke. It reviews the types of questions used in health surveys to gauge people's awareness and knowledge about heart disease and stroke, including warning signs, what people should or would do in the event being present when someone was having a heart attack or stroke, and what people know about preventing or lowering their risk for CVD. The information gathered was intended to assist the development of a questionnaire suitable for use in New Zealand.

A search was made using both browsers and literature databases including Google Scholar and the *Medline* database. Search parameters were set to include articles published in 1995 or later, in English and with a full text version available. The literature database compiled had a total of 57 survey research articles. Of the 57 articles, 27 related to coronary heart disease (CHD) and 30 to Stroke. These articles are not a complete collection of all the surveys carried out related to knowledge about heart disease and stroke. Rather they comprise a reasonably large sample of studies which are likely to represent the range of different approaches used in such surveys.

The analysis of the articles collected focused on the following topics:
1. Samples and surveys methods
2. Types of questions included in CHD and stroke surveys
3. Differences in knowledge among population groups
4. Interventions to improve knowledge about CHD and stroke and reduce the risk of CVD

Samples and survey methods
The types of samples used in the 57 studies comprised four main groups; (a) general adult population samples, (b) specific groups which were selected by age or from a specific location such as a health service, (c) participants selected by health status such as having experienced a heart attack or stroke, and (d) health care providers such as physicians, general practitioners or cardiac specialists.

The main survey modes used were face-to-face interviews, self-completion questionnaires and telephone surveys. For general population surveys, especially those which selected large samples (>1000), telephone surveys were most often used. For groups selected by age or contact with a health centre, interviews and self-completion questionnaires were commonly used. For people selected by health status, such as those who had experienced stroke or CHD, self-completion questionnaires were most often used. Surveys of health providers primarily used self-completion questionnaires.

Types of questions included in CHD and stroke surveys
Four general categories of questions were commonly used in surveys. These were;
(a) general knowledge and awareness of risk factors for CHD and stroke which included knowledge about the risks of high blood cholesterol, hypertension, smoking, excess weight and lack of exercise,
(b) recognition of symptoms and warning signs,
(c) actions to take if someone were having a heart attack or stroke, and
(d) asking survey participants to assess their own risk of experiencing a heart attack or stroke.

Other topics covered in surveys included questions about sources of information in relation to CHD and stroke, personal experiences, knowledge about the part of the body affected (for surveys relating to stroke) knowledge about treatments used, self-efficacy and barriers to improving heart health.

Four main types of question formats were used. These formats included open-ended, semi-structured, and structured questions and structured responses to statements. Some surveys included questions with more than one format, for example using open-ended questions initially, followed by structured questions.

Six articles included questions designed for health care providers. These questions included provider attitudes and treatment practices in relation to risk factors and prevention of CHD and stroke. They also included questions on providers' clinical knowledge related to CHD and stroke, assessment of risk for specified conditions, and preferred treatment practices when presented with case studies.

Differences in knowledge among population groups
Differences in knowledge about the risk factors and warning signs for CVD and stroke were reported in many of the surveys. In terms of gender differences, women tended to have more knowledge of the risk factors and warning signs for CHD and stroke. With regard to age differences, people in the middle adult age groups (around 40-64 years) tend to be more knowledgeable than older (65+ years) and younger age groups (less than 35 years). Studies in the United States which made comparisons based on ethnicity were reported that Blacks and Hispanics had lower levels of knowledge and awareness of CVD and stroke than Whites. Surveys which made comparisons based on education and/or socio-economic status, reported higher levels of knowledge about CVD and stroke risk factors among people with higher levels of education and higher SES.

Interventions to improve knowledge about CHD and stroke
Educational interventions have been used with multiple population groups including general adult (2), specific groups selected by age or location (7) and groups selected by health status (5). These interventions range from brief one-session events lasting less than an hour to extensive programmes over several weeks run in high schools. Four studies reporting programmes designed to modify risk factors used groups selected as high risk (e.g., older age groups) or people having a previously identified health risk factor such as having had a stroke. Two mass media programmes both used television and print media advertisements in selected cities or regions.

Interventions using educational videos have reported increases in knowledge and awareness when compared to non-intervention groups. However, the increases are often not sustained after one month. Surveys assessing the impacts of television campaigns have reported significant increases in awareness for the middle age groups (45-64 years) but not for those over 65 years of age. Print advertising was generally not as effective as television advertising.

Assessing knowledge about cardiovascular disease and stroke: A literature review

Cardiovascular disease (CVD) and stroke are the most common causes of death and disability in New Zealand adults, accounting for 40% of deaths (Sharpe, 2006). Effective community-based educational and preventive programmes require an accurate assessment of the baseline knowledge of CVD risk factors and warning symptoms in a population. An initial literature search to look for specific information on suitable measures or questions relating to New Zealand population groups failed to find any survey research. The present literature review is intended to assist the development of a questionnaire measuring awareness of the risk factors for CVD and stroke that can be used in surveys of the general public and specific high risk groups in New Zealand.

The American Heart Association Expert Panel report on awareness and behaviour change notes the central role of awareness and knowledge as a one of the key elements of heart health promotion. Awareness of risk factors and knowledge how to change risk factors are precursors needed in health promotion initiatives which will lead to reduction in risks and reduced CVD death and disability. Their model is shown in Figure 1. In this model "Increased awareness and knowledge is often a necessary first step before behavioral change" (Carleton et al, 1996) and is easy to measure. However, they noted the associated limitation that awareness and knowledge on their own are universally perceived as insufficient for promotion and maintenance of long-term behavioural change. Given these assumptions, a survey questionnaire, which measures relevant aspects of awareness and knowledge related to heart disease and stroke, can play a useful role in assessing the effectiveness of health promotion initiatives.

Figure 1: Steps toward fulfillment of the American Heart Association mission

Source: Carlton et al, 1996

The present literature review focuses on previous research on public awareness of CVD and stroke. Specifically it reviews the types of questions used in health surveys to gauge people's awareness and knowledge about heart disease and stroke, including warning signs, what people should or would do in the event being present when someone was having a heart attack or stroke, and what people know about preventing or lowering their risk for CVD. The information gathered was intended to assist the development of a questionnaire suitable for use in New Zealand.

While there are numerous CVD and stroke prevention programmes in New Zealand and several reports on the relationship between CVD and a range of other relevant variables, such as socio-economic inequalities (e.g., Metcalf et al, 2008) there appears to have been little research on public awareness of and knowledge about CVD and stroke. A recent survey of New Zealanders' Health (MOH, 2008) covered experiences of and treatment of CVD and stroke, but did not include public awareness or knowledge of relevant health risks.

Information about awareness of and knowledge about CVD would be useful in helping policy makers, programme planners and funding agencies make informed decisions about effective ways of promoting healthy lifestyles which reduce the risk of CVD. It has been noted that despite a fall in rates of coronary heart disease (CHD) since the 1960s in New Zealand, there are indications of high rates of CHD among people born since 1951, among population groups experience higher levels of deprivation (Sharpe, 2006), and among New Zealanders compared to Australians (Stewart et al, 2008).

This literature review focuses on the following topics:
1. Samples and surveys methods
2. Types of questions included in CVD and stroke surveys
3. Differences in knowledge among population groups
4. Interventions to improve knowledge about CVD and stroke and reduce the risk of CVD

The review did not include research studies or surveys which only included questions relating to clinical risk assessment for heart attack or stroke, such as blood pressure levels or cholesterol levels.

Several search strategies were used for the review. Initially members of the research team provided articles they thought were likely to be useful to the literature review. Using these articles a several groups of keywords for database searches were identified. These included
      a. heart disease, cardiovascular disease, stroke
      b. awareness, knowledge
      c. risk factors, prevention
      d. questionnaire, survey

A search was made using several browsers and literature databases. An initial search was conducted using Google Scholar using combinations of the key words noted above. Relevant papers were downloaded or accessed through the *Medline* database. Several searches were also carried out on *Medline*. The search parameters were set to include articles published in 1995 or later, in English and with a full text version available. In the initial search conducted during October and November 2007 35 reports that were judged as relevant to the review topic were identified. These included 30 published journal articles and 5 other technical reports accessed from web sites. In a second search in August 2008 using Medline another 22 journal articles were located and incorporated into the literature database giving a total of 57 articles. Almost all the articles in the final sample selected were published between 2000 and 2008. These articles are not an exhaustive or complete collection of all the surveys carried out measuring knowledge about heart disease and stroke that have been published in English. Rather they comprise a reasonably large sample of studies which are likely to represent the range of different

approaches used in such surveys. Of the 57 articles, 27 related to coronary heart disease (CHD) and 30 to Stroke.

The database of 57 articles was imported into the NVivo qualitative analysis software (v7) and analyses carried out focussing on salient features of the research articles. The coding process focussed primarily on the following details; the samples and survey methods, the types of questions used and whether the survey was part of a health intervention.

1. Samples and survey methods

In this section the samples and survey methods used by the 57 studies which formed the study sample for the literature review are reported. The main survey methods are shown in Table 1. These were face-to-face interviews (28/57), self-completion questionnaires (19/57) and telephone surveys (15/57). As some studies used more than one survey mode, the frequencies add to more than 57. Self-completion questionnaires included mailed paper questionnaires, paper questionnaires distributed directly to participants (e.g., attending a health care clinic) and web surveys completed on the internet.

Table 1: Survey mode used for CHD and stroke studies

Survey mode	CHD (N=27)*	Stroke (N=30)	Totals (N=57)
Interview (face-to-face)	14	14	28
Self-completion questionnaire (Handed out, postal or web survey)	8	11	19
Telephone survey	8	7	15
Total (for frequency used)	30	32	62

Note: Some studies used two types of survey so frequencies exceed sample sizes

The main types of sample used in the 57 studies are shown in Table 2. These have been grouped into four categories; general adult population samples, specific groups which were selected by age or from a specific location such as a health service, participants selected by health status such as having experienced a heart attack or stroke, and health care providers such as physicians, general practitioners or cardiac specialists.

Table 2: Samples used in CHD and stroke surveys

Sample type	CHD (N=27)	Stroke (N=30)	Totals (N=57)
General adult	10	11	21
Specific group	7	13	20
Selected by health status	7	7	14
Health care provider	5	1	6
Totals	29	32	61

Note: Some studies used two types of samples so frequencies exceed sample sizes

Examples of text used to describe the study samples in some of the articles are shown in Table 3, for each of the four sample categories described above.

Table 3: Sample descriptions in CHD and stroke survey articles: Examples

Sample type	CHD Examples (29 samples)	Stroke examples (32 samples)
General adult • 10 CHD • 11 Stroke	• civilian, adult population aged >=18 years • stratified, probability samples of 2200 adults 18 to 74 years old • nationally representative sample of 1,005 women • national random sample of women 25 years or older • ...7958 completed questionnaires from 42 527 households approached by telephone and another 5467 door-to-door in Poland & Romania.	• Random-digit dialing survey conducted in 2003. Respondents were 1024 women >=25 years • Households with a telephone were sampled at random from the Greater Cincinnati, Ohio, area. • The study was based on a convenience sample at public places (downtown area, subway and bus stations) of 5 major Brazilian cities
Specific group Selected by age or location • 7 CHD • 13 stroke	• persons 50 years of age who were living in Västmanland, Sweden • 4976 people between the ages of 55 and 74 years are included in the present analysis • multicenter, longitudinal study of the evolution of CVD risk factors in Black and White adults aged 18–30 years • 100 adult patients (age 18 and over), both male and female, using the ED population as our source of participants	• convenience sample of participants who attended an advertised community stroke screening which attracted at-risk patients, with more than half of the sample exhibiting at least 1 modifiable risk factor • 561 children (grades K-8) in a parochial school (US) • people who were >40 years and registered at a health center • 250 between 40 & 65 years registered with one general practice in North Staffordshire
Selected by health status 7 CHD 7 Stroke	• ... people with coronary heart disease (N = 3130) • 5009 Finnish-speaking people with CHD, aged 45-74 years • Subjects (n = 509) younger than 71 years were screened at least 6 months after an acute cardiac event or revascularization	• ... 286 patients attending our stroke outpatient clinic for the first time after a first stroke • Patients admitted from the emergency department with possible stroke • ...patients, aged 18 years and older, who had had a TIA or minor ischemic stroke within the preceding 3 months
Health care provider 5 CHD 1 Stroke	• ...internists and OB/GYNs who attended Grand Rounds presentations for the NY ...Heart Disease Initiative • a representative postal survey among physicians in Münster and 4 adjacent counties NW Germany • online study of 500 randomly selected physicians (300 primary care physicians, 100 OB/GYN and 100 cardiologists)	• We randomly selected 490 practicing GPs from New South Wales, the most populous state in Australia

A cross-tabulation of the survey mode with type of sample is shown in Table 4. There was a trend for telephone surveys to be used most commonly with general adult samples. Some of the large scale telephone surveys with over 1000 respondents commonly employed commercial market survey companies to carry out the survey (e.g., Christian et al., 2007; Merz et al., 2002; Mosca et al., 2004). Surveys involving specific groups and participants selected by health status most commonly used interviews and self-completion questionnaires as the survey mode.

For the 30 studies which reported using self-completion questionnaires, 20 used paper questionnaires which were handed directly to participants and nine used postal surveys (Note: one study used both a postal survey and questionnaire handed out). Only two of the surveys used web-based questionnaires, both with primary health care provider (physician) samples. However, as more people gain access to the Internet, more surveys are likely to be conducted using web-based self-completion questionnaires.

Table 4: Survey mode by sample type

Survey mode	Sample type				Totals
	General adult	Specific group	Selected by health status	Healthcare provider	
Telephone	13	4	2	1	20
Interview	5	7	5	0	17
Self-completion questionnaire	4	10	10	6	30

Note: Frequencies add to more than sample numbers as some studies
reported two survey modes and/or two sample types

Summary
The types of samples used in the 57 studies comprised four main groups; (a) general adult population samples, (b) specific groups which were selected by age or from a specific location such as a health service, (c) participants selected by health status such as having experienced a heart attack or stroke, and (d) health care providers such as physicians, general practitioners or cardiac specialists.

The main survey modes used were face-to-face interviews, self-completion questionnaires and telephone surveys. For general population surveys, especially those which selected large samples (>1000), telephone surveys were most often used. For groups selected by age or contact with a health centre, interviews and self-completion questionnaires were commonly used. For people selected by health status, such as those who had experienced stroke or CHD, self-completion questionnaires were most often used. Surveys of health providers primarily used self-completion questionnaires.

2. Types of questions included in CVD and stroke surveys

This section covers the types of questions reported in the 57 research articles relating to knowledge about heart disease and stroke. In the first part of the analysis, any text from the articles which related to the specific types or content of questions was grouped into a single large data set. Fifty-six out of 57 articles gave information about the specific types of questions used in the survey. One published article relating to CHD (Merz et al, 2002) gave no information about the specific types of questions used. The collated text segments were then sorted into specific categories of questions based on the type of question content. From this analysis two main groups of question types were compiled; questions most commonly used in surveys (10 or more out of 56 papers), and other types of questions used in some surveys. These two groups are listed in Tables 5 and 6 below. Examples of questions used for each type within the two groups are shown in Tables 7 and 8.

Table 5: Most commonly used types of survey questions

Type of question and description	Number of articles	
	CHD (N=26)	Stroke (N=30)
1. *Recognition of symptoms and warning signs* of heart attack or stroke. These could include, for example, chest pain in the case of a heart attack; severe headache for stroke.	5	19
2. *Actions to take*. This includes questions about what someone would do if they were present when someone else has a heart attack or stroke. It can also ask what they did if they had been present at a previous event.	3	10
3. *Knowledge about risks and prevention* for heart attacks and stroke including lifestyle patterns such as regular exercise, diet and family history.	16	18
4. *Assessing own risk*. Asking participants to rate their chances of having a heart attack or stroke.	7	3

Note: 26 out of 27 CHD articles provided information about the specific types of questions used in the survey

The most common types of questions covered participants' general knowledge and awareness of risk factors for CHD and stroke. These included knowledge about the risks of high blood cholesterol, hypertension, smoking, relatives who had experienced CHD or stroke, excess weight and lack of exercise (Christian et al., 2007; Kirkland et al., 1999; Merz et al., 2002, Mosca et al., 2004). It also included questions relating to knowledge of diet, excess fats, excess salt, high-cholesterol foods, stress or worry, and their impact on health. One study categorized awareness as involving "awareness of stroke signs, awareness of risk factors and awareness of action to be taken by patients once a stroke occurs" (Alkadry et al, 2005, p.79).

Two topics which were often included in surveys were; recognition of symptoms and warning signs, and actions to take if someone were having a heart attack or stroke. It was

notable that these two types of questions were much more commonly used in stroke studies than in surveys relating to CHD (see Table 5).

The fourth most common topic involved questions which asked survey participants to assess their own risk of experiencing a heart attack or stroke.

The other topics covered in surveys are shown in Table 6. These topics included questions about sources of information in relation to CHD and stroke, personal experiences, knowledge about the part of the body affected (for surveys relating to stroke) knowledge about treatments used, self-efficacy and barriers to improving heart health.

Examples of questions used for each of the topics listed in Tables 5 or 6 are shown in Tables 7 and 8.

Table 6: Other types of questions used in surveys

Type of question and description	Number of articles using*	
	CHD (N=26)	Stroke (N=30)
5. *Sources of information*. This includes asking where people obtained information about CVD and stroke, or where they have seen information on these.	0	9
6. *Personal experience*. Whether respondents have ever experienced a heart attack or stroke or if someone they know such as a family member or relative has had the experience.	4	2
7. *Part of body affected*. Which part of the body is affected by heart attack or stroke	0	6
8. *Treatment knowledge*. Knowledge about the types of treatment commonly used for people who have had heart attack or stroke	2	3
9. *Self-efficacy*. Extent to which people believed they could change their lifestyle to reduce risk of heart attack or stroke	3	0
10. *Barriers to improving heart health*. What are the barriers that respondents report in relation to improving their lifestyle to reduce risk of heart attack and stroke?	3	0

Note: 26 out of 27 CHD articles provided information about the specific types of questions used in the survey

Table 7: Examples of questions used in previous surveys for most common topics

Type of question	Examples of questions
1. Recognition of symptoms and warning signs	What are the signs or symptoms of a person having a stroke? Try to tell me as many as you can (Rowe, 2000) I am going to read you a list of signs or symptoms. For those you think are related to strokes, please answer "Yes." If you do not think it is a symptom of a stroke, please answer "No." (Rowe, 2000)
2. Actions to take if someone has a heart attack or stroke	What would you do if someone you knew had a stroke? (Dressman, 2002) How quickly do you need to go to a hospital? (1 immediately, 2 the same day, 3 the next day, 4 after your doctor tells you to go) (Rowe, 2000)
3. Knowledge about risks and prevention for heart attacks and stroke	Can you tell me what are the major causes of heart disease or heart problems? (Kirkland, 1999; Potvin, 2000) Based on what you know, what are the major causes of heart disease? (Scott, 2006) What are the risk factors of stroke? (Evci, 2007)
4. Assessing own risk.	Compared with other people your age, how likely do you think it is that you could have a heart attack in the next 5 years? (1 =much less likely, to 5 =much more likely). (Dracup, 2008) How do you perceive your own risk of having a heart attack (or a new attack if you have had one)? (1= very high; 2= high; 3= moderate; 4= small; 5= non-existent). (Aalto, 2007)

Table 8: Examples of questions used in previous surveys for other topics

Type of question	Examples of questions
5. Sources of information.	What are the sources of your information? (Evci, 2007)
6. Personal experience.	Have you ever seen a person suffering from stroke? (Evci, 2007) Have you ever been told by a physician that you had TIA or a mini stroke? (Johnston, 2003)
7. Part of body affected.	Which organ is primarily affected when you have a TIA or stroke? (Maasland, 2007) What part of the body is injured during a stroke? (Kothari, 1997)
8. Treatment knowledge.	Which items can be regarded in your view as an effective treatment for cardiovascular disease? (garlic, aspirin, cholesterol lowering medication, vitamin E, antibiotics, blood pressure lowering medication, cardiac depressants) (Maasland, 2007)
9. Self-efficacy.	Self-efficacy to prevent HD involved 2 items that asked participants to indicate "the strength of my belief that I can prevent myself from developing HD at this time in my life (in the future)" (Scott, 2006)
10. Barriers to improving heart health.	The first set of questions asked about barriers to implementing heart disease prevention services in clinical practice (e.g., insufficient time, lack of training in prevention, limited reimbursement, or lack of patient interest). (Barnhart, 2007)

General survey questionnaires

Several papers noted that they used survey questionnaires or survey data sets derived from previous surveys. Several questionnaires of this type were identified during the review. Most covered multiple topics and had been used by more than one research team. Those identified were:

- BRFSS - Behavioral Risk Factor Surveillance Survey
- NHANES (National Health and Nutrition Examination Survey)
- REACT questions
- American Heart Association (AHA) Annual Statistics reports

BRFSS - Behavioral Risk Factor Surveillance Survey
The BRFSS programme coordinates a series of state-based health telephone surveys to collect information about health risk behaviours, preventive health practices, and health care access related to chronic disease and injury for each of the 50 states in the United States. The BRFSS describes itself as

> *...the world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984.*
> (Source: http://www.cdc.gov/BRFSS/ Accessed 27 January 2009)

As part of the Centers for Disease Control and Prevention (CDC), the BRFSS collects monthly data in all 50 states from samples including adults 18 years or older. More than 350,000 people are interviewed each year. States within the USA use BRFSS data to identify emerging health problems, establish and track health objectives, and develop and evaluate public health policies and programs. Many states also use BRFSS data to support health-related legislative efforts. The 2008 BRFSS Questionnaire includes four questions about health insurance, regular care provider, and last health checkup. Prevalence data by state can be sorted by race, gender, age, income, or education. (Source: http://www.cdc.gov/BRFSS/ Accessed 27 January 2009)

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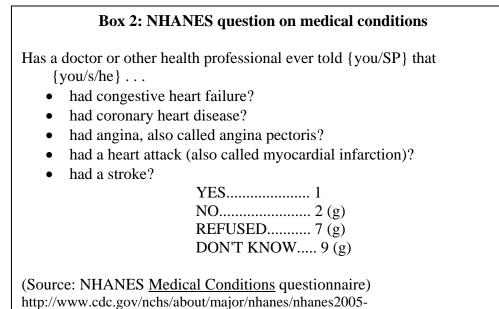| **Box 1: BRFSS questions on cardiovascular disease** |
| |
| Now I would like to ask you some questions about cardiovascular disease. |
| Has a doctor, nurse, or other health professional EVER told you that you |
| had any of the following? |
| (Ever told) you had a heart attack, also called a myocardial infarction? |
| (Ever told) you had angina or coronary heart disease? |
| (Ever told) you had a stroke? |
| 1 Yes |
| 2 No |
| 7 Don't know / Not sure |
| 9 Refused |
| |
| (Source: Behavioral Risk Factor Surveillance System Questionnaire 2009 |
| http://www.cdc.gov/BRFSS/   Accessed 27 January 2009 |
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NHANES - National Health and Nutrition Examination Survey
The National Health and Nutrition Examination Survey (NHANES) is a program of
studies designed to assess the health and nutritional status of adults and children in the
United States. The survey combines face-to-face interviews and physical examinations.
NHANES is a major program of the National Center for Health Statistics (NCHS) which
is part of the Centers for Disease Control and Prevention (CDC). The NHANES survey
sets consist of multiple questionnaires sets which can be used in various combinations,
depending on the focus of a specific survey. There are specific questionnaires which cover
the following topics; personal experience of the physical symptoms for on cardiovascular
disease, medical conditions experienced (including congestive heart failure, CHD, angina,
heart attack and stroke), blood pressure, physical activity diabetes, and smoking and
tobacco use. NHANES was used Muntner et al., (2006) among the articles surveyed in
this review.

Box 2: NHANES question on medical conditions

Has a doctor or other health professional ever told {you/SP} that
    {you/s/he} . . .
- had congestive heart failure?
- had coronary heart disease?
- had angina, also called angina pectoris?
- had a heart attack (also called myocardial infarction)?
- had a stroke?

                YES..................... 1
                NO...................... 2 (g)
                REFUSED........... 7 (g)
                DON'T KNOW..... 9 (g)

(Source: NHANES Medical Conditions questionnaire)
http://www.cdc.gov/nchs/about/major/nhanes/nhanes2005-
    2006/questexam05_06.htm Accessed 27 January 2009.

REACT questions
The REACT questions (Rapid Early Action for Coronary Treatment) were developed as
part of the community intervention trial designed to reduce delay in seeking in seeking
medical help after symptom onset for acute myocardial infarction (Simons-Morton et al.
1998). The questions given to patients were designed to collect information on knowledge,
attitudes and beliefs about CHD and symptoms, as well as intended behaviours in response
to evolving AMI symptoms (Goff et al, 1998). The REACT questions were used by
Buckley (2007) and referred to by several other articles in the current review.

The two open-ended questions used for knowledge regarding heart attack symptoms were
the following:
- What would you say are the signs or symptoms that someone may be having a
  heart attack?
- Of the heart attack signs or symptoms you just mentioned, which one would you
  say is the most important? (Goff et al, 1998, p. 2330).

American Heart Association Annual Statistics reports
Each year, the American Heart Association, in association with the Centers for Disease Control and Prevention, the National Institutes of Health, and other government agencies, Collates and publishes statistics on heart disease, stroke, other vascular diseases, and their risk factors. It reports these statistics in its Heart Disease and Stroke Statistical Update. The most recent version located is the 2009 report (Lloyd-Jones, et al., 2009). The surveys on which the 2009 report was based included:

- Behavioral Risk Factor Surveillance Survey (BRFSS) - ongoing telephone health survey system
- Greater Cincinnati/Northern Manhattan Stroke Study (GCNKSS) - stroke incidence rates and outcomes within a biracial population
- Medical Expenditure Panel Survey (MEPS)—data on specific health services that Americans use, how frequently they use them, the cost of these services, and how the costs
- are paid
- National Health and Nutrition Examination Survey (NHANES)—disease and risk factor prevalence and nutrition statistics (Lloyd-Jones et al., 2009, p. e28)

Framing of questions in surveys
There were major differences in the way questions were framed in the various surveys when focussing on the same topic. In general terms there were four main types of question formats used in the papers reviewed. These formats ranged from open-ended, semi-structured, and structured questions and structured responses to statements. These formats are described with examples in Table 9. Some surveys included questions with more than one format, for example using open-ended questions initially, followed by structured questions.

In terms of the two general approaches used to assessing public awareness of risk factors (open-ended versus structured questions) Potvin et al. (2000) regarded the structured format questions as giving "consistently greater estimated levels of knowledge" (p. s6), In contrast, some researchers expressed concern that structured or closed ended questions could result in higher estimates of awareness than open-ended questions (Greenlund et al., 2004). For these reasons, some researchers include both types of questions as they are assessing somewhat different types of knowledge. These are unprompted recall (open-ended questions) and recognition when provided with a list (structured questions)

A study of stroke knowledge (Rowe et al., 2000) which required participants to recognize risk factors from a list noted that this question format to overestimate knowledge, compared to open-ended questions that assess memorized knowledge. They reported relatively low levels of awareness of stroke warning signs when measured by an unprompted question, and a much greater proportion of respondents recognized stroke warning signs when signs were read from a list. Rowe et al considered open-ended questions would be more effective for evaluating the impact of a prevention awareness campaign.

Table 9: Common question formats for framing questions

Question format	Examples of questions
1. Open-ended (multiple responses possible, responses may be recorded verbatim or coded using prepared categories)	Can you tell me what are the major causes of heart disease or heart problems? (Kirkland et al, 1999) What are the warning signs of stroke? (Evci et al, 2007)
2. Semi-structured (limited ranges of responses possible, pre-coding of responses often used)	Does reducing the amount of salt you eat reduce the risk of a heart attack? Do you think that stroke is preventable? (Evci et al, 2007) (Yes, No, Maybe) (Yes, No, Don't know)
11. Structured question: Specific response required to a question relating to an item or list. Specific range of response options provided for each item, respondent chooses one option	Which of these items do you consider risk factors for cerebrovascular or cardiovascular disease? (High blood pressure, asthma, stress, reduced exercise, obesity, high cholesterol levels, muscle disease, renal stones, reduced vitamins, excessive alcohol intake, intensive exercise, smoking, diabetes, sex) (Maasland et al, 2007)
12. Structured response to a statement or list of statements. Specific range of response options provided for each item, respondent chooses one option	I am going to read you a list of phrases about strokes. Please tell me how much you agree with each one by rating it on a scale from 1 to 10. If you agree strongly with the statement, give it a 10. If you disagree strongly, give it a 1. .... • A person can reduce his or her risk of having a stroke • There are emergency treatments for stroke (Rowe et al, 2000)

Questions used in surveys of health care providers

Six of the articles included questions designed for health care providers. These questions covered provider attitudes and treatment practices in relation to risk factors and prevention of CHD and stroke. Some examples of questions used with health care providers are shown in Table 10 below.

As can be seen in the Table, questions for providers focussed on clinical knowledge related to CHD and stroke, assessment of risk for specified conditions, and preferred treatment practices when presented with scenarios or case study examples.

Table 10: Examples of questions used with health care providers

CHD Examples	*Stroke examples*
....a self-administered questionnaire exploring: (i) knowledge of and attitudes and treatment practices toward risk factors in secondary prevention of CHD; (ii) knowledge of and attitudes toward clinical guidelines on secondary prevention of CHD. We used a four-point Likert scale to assess knowledge ... toward different guidelines and coronary risk factor treatment. (Heidrich et al, 2005)	...we asked GPs to indicate whether each of 13 stroke risk factors was modifiable in general practice. Risk factors were classified as clinical factors (n=8) or lifestyle (n=5). GPs were then asked to indicate the average risk for a 45-year-old man of having a stroke before 85 years of age (correct response, 1 in 4). We also asked respondents to estimate the proportion of strokes attributable to hypertension (correct response, about one quarter). Respondents then were asked to indicate their level of agreement with each of 10 statements from key stroke publications (strongly agree to strongly disagree). (Middleton et al, 2003)
Each physician was presented 10 patient cases with information about age, sex, ethnicity/race, smoking status, total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides, blood pressure, treatment for hypertension, body mass index (BMI), family history of CHD, and personal history of CHD or diabetes mellitus. Once physicians assigned a level of risk to each of the 10 cases, they were asked to specify their preventive treatment recommendations from a prespecified list of possible interventions. (Mosca et al, 2005)	In... our questionnaire, we presented 4 case scenarios. Case 1 was a previously symptomatic 62-year-old man who had recently been discharged from hospital after a nondisabling stroke; case 2 was a symptomatic 62-year-old woman with a history of recent carotid transient ischemic attack (TIA); case 3 was an asymptomatic 62-year-old woman with a neck bruit; and case 4 was an asymptomatic 63-year-old man who had previously undergone a CEA ("asymptomatic other side"3). (Middleton et al, 2003)

Summary

Four general categories of questions were commonly used in surveys. These were;

(e) general knowledge and awareness of risk factors for CHD and stroke which included knowledge about the risks of high blood cholesterol, hypertension, smoking, excess weight and lack of exercise,

(f) recognition of symptoms and warning signs,

(g) actions to take if someone were having a heart attack or stroke, and

(h) asking survey participants to assess their own risk of experiencing a heart attack or stroke.

Other topics covered in surveys included questions about sources of information in relation to CHD and stroke, personal experiences, knowledge about the part of the body affected (for surveys relating to stroke) knowledge about treatments used, self-efficacy and barriers to improving heart health.

There were four main types of question formats used in the papers reviewed. These formats ranged from open-ended, semi-structured, and structured questions and structured responses to statements. Some surveys included questions with more than one format, for example using open-ended questions initially, followed by structured questions.

Six of the articles included questions designed for health care providers. The questions included provider attitudes and treatment practices in relation to risk factors and prevention of CHD and stroke. They also included questions on providers' clinical knowledge related to CHD and stroke, assessment of risk for specified conditions, and preferred treatment practices when presented with case studies.

3. Differences in knowledge among population groups

A number of surveys using general population samples reported differences in knowledge of risk factors and warning signs for CVD among specific demographic groups. This section covers findings in relation to the different levels of knowledge and awareness among demographic groups in general population surveys. These surveys usually made comparisons based on gender, age, ethnic group, socioeconomic status and other demographic factors. Changes in awareness over time are reported where available.

Gender differences
Several studies reported gender comparisons in general population samples. In general, women reported more knowledge of the risk factors and warning signs for CHD and stroke. (e.g., Munter et al, 2006; Potvin et al, 2000). However a few studies reported small or no gender differences in specific areas of knowledge and awareness related to CVD and stroke (Kirkland et al, 1999).

A series systematic comparison between men and women of varying socio-economic backgrounds and educational levels demonstrated that women had consistently better knowledge about cardiovascular risk factors independent of their socio-economic background (Andersson et al, 2001). In a study of people with diagnosed coronary artery disease, women were more knowledgeable than men about ACS symptoms and more likely to see themselves at higher risk than age-matched healthy controls (Dracup et al, 2008). Symptom recognition and being aware of the need to call an emergency phone number was higher among women, compared to men (Greenlund et al, 2004).

Some studies which made gender comparisons also noted instances where there were few or no gender differences (e.g., Perkins-Porras et al, 2006). For example, Kirkland et al, (1999) reported that men and women did not differ in awareness of high blood cholesterol, smoking, excess weight and lack of exercise as major causes of heart disease. However, more women than men were aware of hypertension (19% v. 12%) and heredity (31% v. 17%) as major causes of heart disease.

Age differences
The findings with regard to age have shown a reasonable clear trend. Most studies have reported that people middle age groups (45-60 years) tend to be more knowledgeable than older and younger age groups (e.g., Christian et al, 2007; Merz et al, 2002; Mosca et al, 2004; Kirkland et al, 1999). This is moderated to some extent by findings that groups who

have experienced a heart attack or stroke tended to have better knowledge than people in the same age group not having personal experience. The age differences reported may represent changing patterns in knowledge and awareness. The middle age-group (40-65 years) are often better educated than older groups about health risks generally and, compared to younger age groups, health risks associated with CVD and stroke become more relevant as they get older. Supporting this trend, the study by Schneider et al., (2003) noted that knowledge about the major causes of cardiovascular disease was low in 64+ years and under 35 years age group, compared to the other age groups (36-63 years).

Ethnic group differences
Given that many of the surveys reviewed were carried out in the United States, most of the ethnic group difference reported compared Blacks, Hispanics and Whites. However there were studies from some other countries which supported a general trend for non-dominant ethnic groups who are likely to have had some experience of discrimination and racism, to report lower levels of knowledge and awareness of CVD and stroke. A likely reason for this finding is that where there are more salient sources of stress such as discrimination, longer term health risks (e.g., smoking, obesity) are less able to be taken into account. However given the association of lower knowledge with poverty and lower levels of education, as well as ethnicity, potential covariate relationships among poverty, education and ethnicity, need to be taken into account.

Another factor to take into account is that substantial ethnic disparities exist in the prevalence, morbidity, and mortality of heart disease and stroke. In the United States, Blacks having the highest rate mortality associated with CVD. The prevalence of risk factors is greatest among ethnic minorities and people with low socioeconomic status. Black and Hispanic women, specifically, are more likely to be diabetic, physically inactive, overweight, and obese compared with white women (Christian et al., 2007, pp.68-69).

In surveys carried out in the United States, Blacks and Hispanics tend to have lower levels of knowledge than Whites (Christian et al, 2007; Lynch et al, 2006; Merz et al, 2002; Mosca et al, 2004, Mosca et al 2006, Schneider et al, 2003). Many of the studies carried out in countries other than the United States did not report any comparisons of knowledge based on ethnicity.

Education and socioeconomic status
There was a consistent trend for studies reporting comparisons based on education and/or socio-economic status, to report higher levels of knowledge about CVD and stroke risk factors among people with higher levels of education and higher SES. (e.g., Alkadry et al, 2005; Andersson et al, 2001; Lynch et al, 2006; Parahoo et al, 2003; Potvin et al., 2000).

Summary
Reasonably consistent differences in knowledge about the risk factors and warning signs for CVD and stroke have been reported in many of the surveys reviewed. In terms of gender differences, women were consistently reported to have more knowledge of the risk factors and warning signs for CHD and stroke. The findings with regard to age differences indicate that people middle age groups (around 40-60 years) tend to be more knowledgeable than older (65+ years) and younger age groups (less than 35 years). Most of the studies making comparisons based on ethnicity were carried out in the United States. In these studies Blacks and Hispanics were reported to have lower levels of

knowledge and awareness of CVD and stroke than Whites. For studies reporting comparisons based on education and/or socio-economic status, higher levels of knowledge about CVD and stroke risk factors were reported among people with higher levels of education and higher SES.

4. Interventions to improve knowledge about CVD and stroke

Among the 57 articles included in the review, 14 studies were identified as reporting an intervention or health promotion initiative. This section summarise key features of these interventions and looks at the broader context of how knowledge and awareness might be linked to health promotion initiatives related to cardiovascular disease.

The stated aims of the 14 intervention studies, and the related outcome measures used, focussed on the following specific areas; increasing knowledge and awareness (8), changes in clinical indicators or behaviours (such as blood pressure, cholesterol, fasting glucose, overweight, smoking and sedentary lifestyle) (3), (c) changes in behavioural intentions (2) and changes in risk perceptions (1) or physical or social functioning (1). Given these findings, most of the intervention studies have aimed at simply increasing knowledge and awareness. Only a few have focussed on clinical and behaviour changes.

Three main types of intervention were described among the 14 articles reporting interventions. These were educational interventions (11), specific programmes to modify risk factors (4) and mass media programmes (2). Some articles reported using more than one type of intervention (e.g., Buckley et al, 2007; Mjelde-Mossey et al, 2005). It was notable that 10 articles reporting stroke-related interventions were located and only four articles for CHD interventions. Whether this reflects a greater level of activity occurring for stroke-related interventions would need to be assessed more systematically. Table 12 describes the three main types of interventions.

Table 12: Types of Interventions

Types of intervention	CHD	Stroke
Educational interventions A range of types of educational interventions including (a) single presentation sessions (e.g., 50 mins.) with a video or speaker, (b) interactive computer programme, (c) school classes and (d) multi-session programmes covering several topics in detail.	4	7
Modify risk factors Individual consultations, usually with a medical assessment to identify specific risk factors, followed by a tailored programme to change specific lifestyle behaviours such as dietary patterns, smoking cessation, and exercise.	0	4
Mass media TV advertisements and print media advertisements in specific cities or locations	0	2

Note: 3 of the 14 studies reported more than one type of intervention

In terms of the details of the interventions, Table 13 provides text examples from the intervention articles. Educational interventions were used with all types of population groups including general adult (2), specific groups selected by age or location (7) and groups selected by health status (5). These interventions ranged from brief one-session events lasting less than an hour to extensive programmes over several weeks run in high schools.

Table 13: Descriptions of Interventions

Types of intervention & purpose	Examples of text descriptions
Education Interventions intended to increase awareness and enhance knowledge to improve knowledge of the nature of stroke and the rationale for treatment; increase awareness of services available while in hospital or after discharge; give advice and information about the prevention of stroke;	Participants randomised to the intervention group received an individual 40- to 50-min face-to-face education and counselling session in an outpatient clinic (Buckley et al, 2007) ... a 12-minute American Heart Association "Are You At Risk For Having A Heart Attack?" video. The video was viewed in the patient's room (Williams et al, 2007) ...an all-school general assembly was held for the sole purpose of this stroke educational program. The Brain Child presentation began with a local TV personality, who briefly described his personal experience with stroke and asked the children to be sure to listen carefully to the presentation so that they might be able to help someone who was having a stroke. (Dressman et al, 2002) The SEP consisted of a rolling program of one 1-hour small-group educational sessions for inpatients and their informal carer followed by six 1-hour educational sessions after discharge from hospital. (Rodgers et al, 1999)
Modify risk factors Individual consultations which are likely to include medical assessments and tailored programmes	CHIP is a four-week community-based intensive educational lifestyle intervention program, designed to assess to what extent a self-selected population may be able to contribute to a shift in coronary risk factors in the community-at-large aiming at primary and secondary prevention (Englert et al, 2007) Personalized health counseling that addressed individual risk factors was offered to all participants. Counseling focused on follow-up with primary care providers for those at risk, and a plan was devised to modify risk factors through medication compliance, dietary changes, smoking cessation, and exercise. (Delemos et al, 2003)
Mass media TV advertisements and print media advertisements in specific cities or regions	The initial stroke campaign was published by advertisements in different German TV stations, newspapers and magazines and on a website. (Kraywinkel et al, 2007) The intervention consisted of a 30-second, black-and-white television advertisement giving the warning signs of stroke (used in Kingston and London) and a print advertisement based on the television ad (used in Hamilton). In Kingston, continuous, high-level television advertising was conducted ... (Silver et al, 2003)

The four programmes designed to modify risk factors reported using specific groups selected as higher risk (e.g., older age groups) or people having a previously identified

health risk factor such as having had a stroke. They included a stroke recovery programme (Smith et al, 2004) and a combined programme for people who had a hospital discharge diagnosis indicating coronary artery disease in the previous 6 months (Buckley et al, 2007). The two mass media programmes both used television and print media advertisements in selected cities or regions.

Intervention outcomes
The most common types of questions used as outcome measures for interventions aimed at increasing knowledge are shown in Table 14. Knowledge about risks and prevention and recognition of symptoms and warning signs for heart attack or stroke were most commonly used.

Table 14: Most commonly used outcome measures for interventions

Type of question and description	Number of articles (N=14)
Knowledge about risks and prevention for heart attacks and stroke.	8
Recognition of symptoms and warning signs of heart attack or stroke.	6
Actions to take. This includes questions about what someone would do if they were present when someone else has a heart attack or stroke.	3
Assessing own risk. Asking participants to rate their chances of having a heart attack or stroke.	3
Part of body affected. Which part of the body is affected by heart attack or stroke	2

A study of awareness of stroke warning signs before and after a television campaign reported that in the communities receiving television advertising, there was a significant increase in awareness for the younger age group (44% to 59%) but not for those over 65 years of age (35% to 40%) (Silver et al., 2003, p.1967). The intervention by Silver et al. (2003) confirmed that print advertising was generally not as effective as television advertising. Television advertising is often promoted because of its ability to reach across demographic groups. In their study television was effective in increasing knowledge among men and those with a high school education or less but not among people over 65 years (Silver et al., 2003).

One concern about intervention studies is related to how long any positive effects resulting from an intervention might last in terms of increased knowledge. Interventions such as showing an educational video on CVD risks have reported increases in knowledge and awareness when compared to non-intervention groups. However few studies have followed people exposed to knowledge-enhancing interventions over several months or years. One study noted that increased knowledge was not sustained after 30 days (Williams et al., 2007).

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