MedicalBiostatistics.com

Epidemiological Measures of health and Disease

Epidemiological Indicators of Adult Health

Epidemiological measures of health and disease
Epidemiological measures of child health
Epidemiological measures of adolescent health
Epidemiological measures of geriatric health

Adapted from Medical Biostatistics, Fourth Edition (MedicalBiostatistics.synthasite.com)
by A. Indrayan (indrayan.weebly.com)
Chapman & Hall/ CRC Press, 2008 US$129.95Available at https://www.routledge.com/Medical-Biostatistics/Indrayan-Malhotra/p/book/9781498799539

Health of an adult can be measured in several dimensions. Again, however, the discussion in this note is restricted to some epidemiological indicators of general health and excludes particular diseases.

Obesity

Obesity has been found to be associated with risk of diseases such as hypertension, atherosclerosis, gallbladder disease, and diabetes. It is now standard practice in clinics to assess obesity and give advice accordingly. It really should be assessed by the amount of fat present in the body, but that is difficult to assess. Weight relative to height is considered as a good surrogate. The following indicators are used.

(i)   Body mass index (BMI) = $\dfrac{\text{weight in kg}}{(\text{height in meters})^2}$.

A BMI between 20 and 25 is considered normal in adults. A low value (particularly BMI < 18) indicates that the person is thin and a high value is indicative of excess fat. BMI between 25 and 30 indicates overweight. A value more than 30 is a definite indication of obesity. BMI is considered age-gender independent in adults, and nearly the same thresholds can be used for females as for males without much error although it is slightly less in females. It is lower in children. Another name for this index is Quetlet's index after the Belgian scientist who first suggested it.

BMI has the same basic form as the general ponderal index mentioned earlier. The exponent of the denominator is 3.0 in case of infants but progressively declines as age advances. It finally settles down to 2.0 for adults that you see in denominator of (i).

(ii)   Broca index for normal weight (kg) = height in cm − 100.

This is extremely simple to understand and to use. It says that if a person's height is 165 cm then the weight should be around 65 kg.

Evenly distributed fat is probably not as harmful as accumulation around the waist. This is measured by

(iii)   Waist-hip ratio = $\dfrac{\text{waist circumference}}{\text{hip circumference}}$

This measures central obesity or abdominal obesity. The normal ranges are 0.8-1.0 for men and 0.7-0.85 for women. A large waist-hip ratio is found to be more closely associated than BMI with risk of some serious conditions such as stroke.

Smoking *(Download)*

Physiological Functions

Besides routine measurements of body temperature, heart rate, blood pressure, etc., it may be useful to measure parameters such as lung functions and cardiac output. Lung functions are measured by a variety of indicators such as expiratory volume and vital capacity. Details are available in Coles [1]. Lung functions can be used to measure positive health because higher values may prove helpful in case of exigencies. Low cholesterol, low sedimentation rate, low bleeding time, and higher hemoglobin level can be considered to indicate progressively better health. An index based on a combination of these or other physiological measurements has not been devised yet.

Physiological measurements can be assessed as normal or abnormal. Borderline values present trickier problems if the terms such as high normal, marginally high and probably abnormal are used. A level of 50 mg/dL of serum urea may be considered normal by one physician and high by another. Blood pressure 130/92 mmHg and homocystein level 15 mol/L are also borderline values. Thus, there is always a risk of misdiagnosis and missed diagnosis. Normality or otherwise of a measurement should be assessed after considering the values seen in healthy and sick subjects with sufficient precautions for overlapping values.

Quality of Life

Myocardial infarction, breast cancer, multiple fractures and peritoneal surgery are examples of conditions that have many survivors but quite a few of them are not able lead a normal life of a healthy person. The disability may be apparent such as in walking and talking, or more subtle as in doing hard work for long hours. Quality of life assessment is gaining importance as more and more people are able to live longer due to medical intervention but retain residual disability of one kind or the other. It is being increasingly assessed for general population as well, or for patients of various types even when there is no disability. Quality of life is also commonly used as an outcome measure in research on the relative benefits of different treatment methods.

Quality of life is generally equated with hopes and ambitions matched by experience. It involves a person's own perception and values. Note that this is quite abstract and thus is difficult to measure. Physical, psychological and social well-being, including functionality in daily living, is generally included in a quality of life assessment. In the case of chronic patients, this may contain items on sleep, appetite, sexual functions, social participation, work performance, etc. It is often considered convenient to divide the quality of life questionnaire

into domains such as physical health and psychological well-being, and to divide a domain into facets such as psychological well−being into negative and positive feeling, self-esteem, and memory.

Several instruments are available that claim to measure quality of life in different kinds of subjects, particularly in patients with chronic ailments. For cardiovascular disease, a quality of life measure is the multidimensional index based on 35 questions on different domains of quality of life developed by Avis et al. [2]. For cancer, there is a quality of life questionnaire, called EORTC QLQ-C30, containing 30 items of inquiry [3]. Because quality of life is mostly the perception of the subject, the rating sometimes may be inconsistent with the actual physical condition such as tumor stage. A patient in an advanced stage of malignancy may still report a good quality of life.

For general population, World Health Organization has devised a quality of life (WHO-QOL) questionnaire with 100 items. This is considered too detailed and difficult to answer. A brief questionnaire (WHO-QOL-BREF) with 26 items is available. More popular is the 'short form' with 36 items called SF-36. This measures functional health and well-being. Such questionnaires can be easily downloaded from various website sites such as *sf-36.org*. These questionnaires may have to be adapted to the local conditions.

REFERENCES

1. Coles JE. *Lung Function Assessment and Application in Medicine.* Oxford: Blackwell Scientific Publications, 1993.
2. Avis NE, Smith KW, Hambleton RK, Feldman HA, Selwyn A, Jacobs A. Development of the multidimensional index of life quality: a quality of life measure for cardiovascular disease. *Med Care* 1996; 34:1102-1120.
3. Sprangers MA, Cull A, Groenvold M, Bjordal K, Blazeby J, Aaronson NK. The European Organization for Research and Treatment of Cancer approach to developing questionnaire modules: an update and overview: EORTC Quality of Life Study Group. *Qual Life Res* 1998; 7:291-300.