2.2.4. Cardiovascular diseases

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Working hypothesis

Our interest in discussing the problem of cardiovascular diseases stems mainly from the role model offered by the cardiovascular area. This is the sector which best represents the ambiguities one is faced with when having to evaluate whether, and to what extent, the epidemiological point of view of a problem corresponds to public health targets or whether it is a reflection (when it is not a promotion) of market demands.

General picture

Cardiovascular morbidity-mortality has emerged strongly over the last 10 -15 years as the main, dominant category in epidemiological statistics which, ever since the publication of the joint report of the World Bank and the World Health Organisation (WHO) entitled the *Global Burden of Disease*[1,2] (GBD), seems to have assumed the role of obligatory point of reference for evaluating and programming investment priorities and interventions in the field of health care in both the North and South of the World.

The scenarios given as examples in **Figure 1, 2** and in **Table 1**, (chosen from among the many given in the most reputable clinical-epidemiological literature) offer so many similarities as to be almost repetitive but allow us to make some simple observations.

1. The risk factors that determine cardiovascular morbidity-mortality were basically the same in all the populations studied, once the average life expectation of each population has lengthened to the point at which such diseases usually appear. This was clearly shown by INTER-HEART[3] (**Figure 3**), the most extensive and representative comparative case-control study carried out so far.
2. Medical causes are closely interwoven with social, economic and environmental causes: hypertension, diabetes, hypercholesterolemia and obesity are not simply pathologies and risk factors, but are also, principally, the product of profound modifications in the conditions of life, in nutrition, in social and economic inequalities and in the stress-hardship of individual and collective living (which makes risks from smoking, alcohol abuse, transverse indicators of cultural and economic emargination, rather than health variables).
3. A strictly, or prevalently, medical reading which describes or interprets this epi-

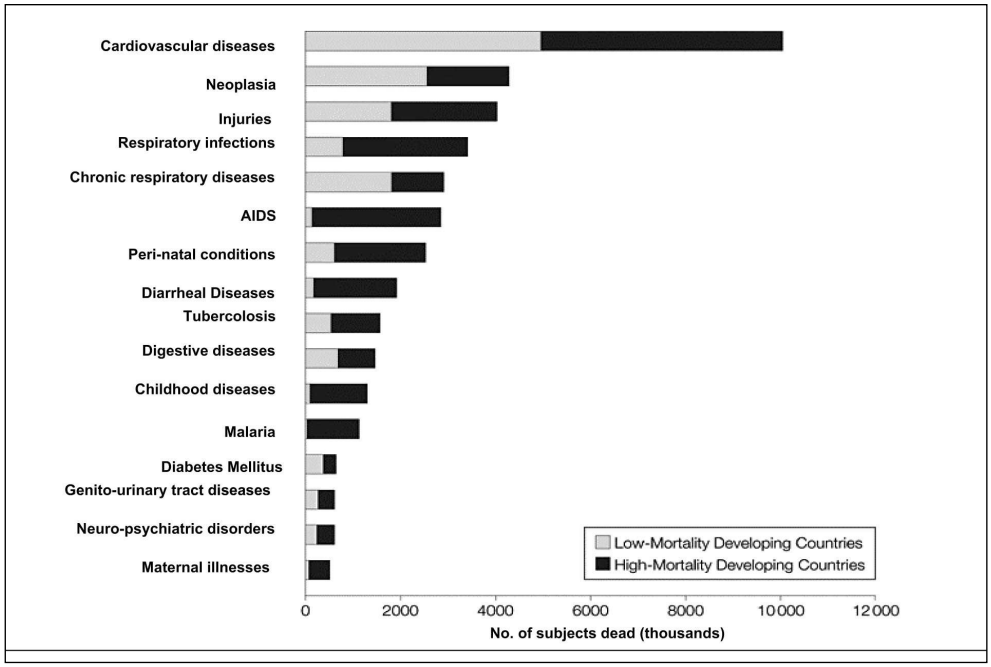

Figure 1. The 16 main causes of mortality in developing countries (2001).
1. Developing countries with low mortality include: China, Brazil and Thailand
2. Developing countries with high mortality include: India, Mali and Nigeria
Figure modified by D. Yach, et al., *The global burden of chronic diseases*, «JAMA», 2004, 291, pp. 2616-2622.

Table 1. Estimate of deaths from ischemic diseases by region and gender, with projections for 2020.

State	Women			Men		
	1990	2020	Increase (%)	1990	2020	Increase (%)
Countries with a stable economic situation	838	1107	32	829	1209	46
Countries with a communist economy	559	702	26	468	712	52
Total Developed countries	***1397***	***1809***	***29***	***1297***	***1921***	***48***
India	556	1197	115	619	1405	127
China	377	684	81	386	811	110
Other Asian Countries	227	552	143	233	581	149
Sub Saharan Africa	117	263	125	92	222	141
Latin America	169	412	144	179	444	148
Middle East	291	717	146	319	874	174
Total Developing countries	***1737***	***3825***	***120***	***1828***	***4337***	***137***
WORLD TOTAL	**3134**	**5364**	**80**	**3125**	**6528**	**100**

Table modified by S. Yusuf et al., *Global burden of cardiovascular diseases: part I: general considerations, the epidemiologic transition, risk factors,and impact of urbanization*, «Circulation», 2001, 104, pp. 2746-2753.

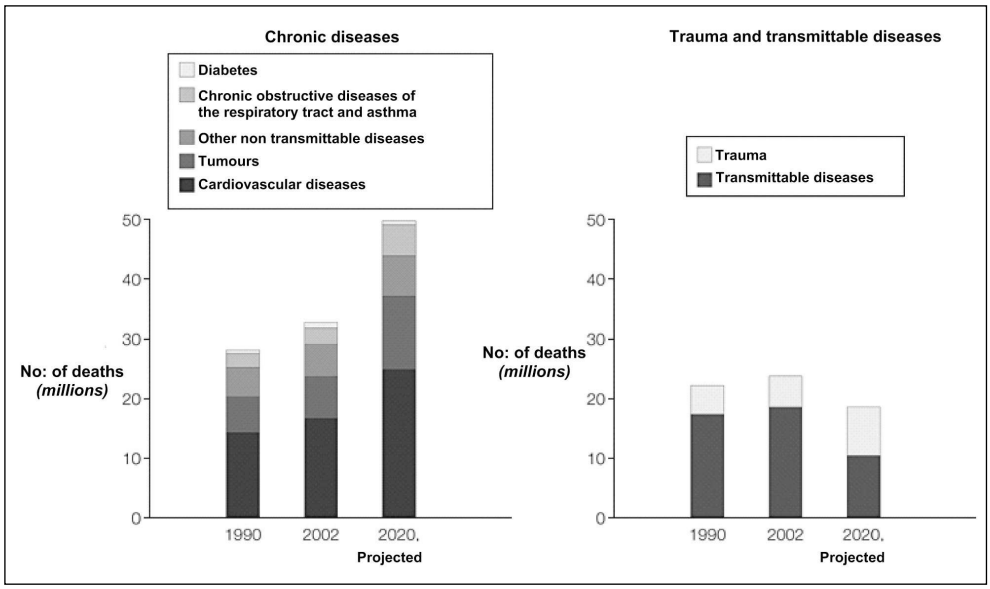

Figure 2. Global mortality for chronic diseases.
Figure modified by D. Yach, et al., *The global burden of chronic diseases*, «JAMA», 2004, 291, pp. 2616-2622 (data from World Health Organization, The World Health Report 2003-Shaping the future, World Health Organization, Geneva, Switzerland 2003 and from J.L.C. Murray, A.D.Lopez (eds.) *The Global Burden of Disease. A comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020*, GBD Series vol. I, Harvard School of Public Health on behalf of the World Health Organization and the World Bank, Cambridge, Massachusetts 1996).

demic in terms of possible – obligatory avoidance, given that there is clear proof that the knowledge and concrete tools available today (drugs, risk charts, guidelines on preventive action) could, at least in principle, permit adequate checks and controls.

4. A more realistic and broader reading of the problem – that which places epidemiological data firmly within the more general picture of the life of populations at risk – brings us back to an evaluation of inevitability for most of the at-risk populations in many countries in the South of the World, populations whose numbers are increasing fast for two main reasons:
   - at risk lifestyles (from nutrition, to sedentary life, to economic and social hardships, to the culture – opportunities for prevention) are usually not the result of the individual's free, informed choices in these populations where the main occupation in life is finding a way to survive;
   - the instruments and technologies required and certified by Evidence Based Medicine are, in reality, less and less available, both for diagnosis and for prevention-treatment purposes, because of the widening gap between the cost of the service and the likelihood of their being re-imbursed (by the public or private sector).

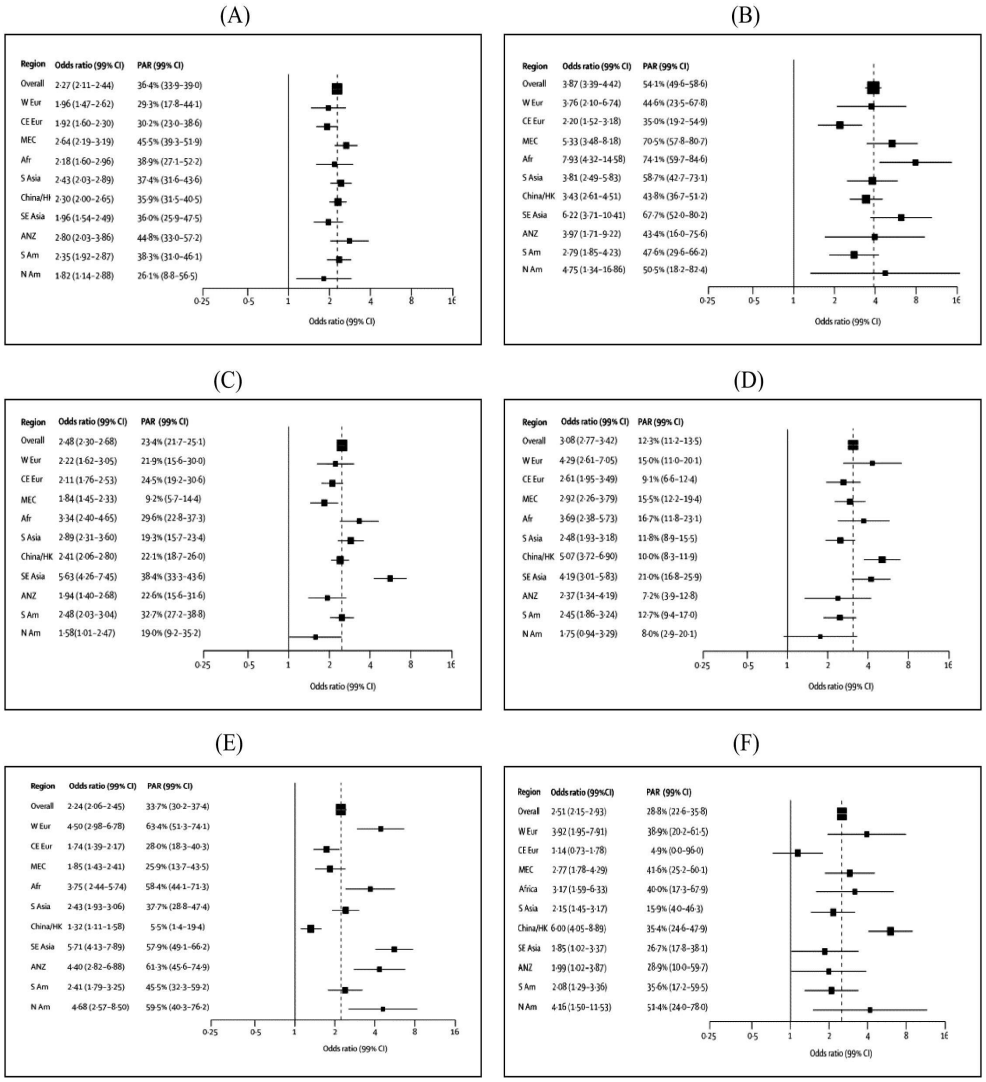

Figure 3. Risk of Acute Myocardial Infarction associated with: smoking (A); the ApoB/ApoA1 relation (B); hypertension (C); diabetes (D); abdominal obesity (E); psycho-social factors (F).

Overall values are given, divided by region, with adjustments for age and gender.
W Eur = Western Europe; CE Eur = Central and Eastern Europe; MEC = Middle East Countries; Afr = Africa; S Asia = South Asia; China/HK = China/Hong Kong; SE Asia = South East Asia; ANZ = Australia and New Zealand; S Am = South America; N Am = North America.
Table modified by S.Yusuf et al., *Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study*, «Lancet», 2004, 364, pp. 937-952.

Cardiovascular disease data as a model for a culture of "ascertainment"

The picture outlined above reveals the typical situation produced by an epidemiology that is increasingly being shaped by the logic and methodologies of estimates, projections, evaluations and macro-economic planning. Description is the dominant element here, the picture is constructed on the basis of variables that, one has to assume, mean the same and are equally reliable (both in defining the parameters of prevalence-incidence-weight of health care burdens and in the scenarios that mark evolution over time in the diverse contexts). It is quite literally astounding (specifically in the cardiovascular area, which is becoming almost obsessively aware of the need to reach a single definition in diagnoses, interventions and results) to see the "normality" with which one compares data from a situation where everything is reimbursed-documented, with data supplied by those who do not have even basic population information and are even less likely to have accurate data on health care, or to be able to guarantee what are considered routine, obvious or standard services (from measuring arterial blood pressure with manual instruments, to creatinine and checking glycaemia).

Estimates of the risk burden and of morbidity-mortality, which are extrapolated from data gathered from non-representative samples of the population, have no part to play in describing needs that must be satisfied but, rather, sketch the outlines of a potential market for interventions (which, in their turn, will not be available because of costs and, because of the lack of a system for monitoring over time).Cardiovascular disease is a chronic clinical condition, characterized by unreal and impracticable costs. For these aspects, cardiovascular disease has now become the indicator of the transformation in the 'virtual' priorities attributed among chronic-degenerative diseases, replacing the more "classic" pathologies of underdevelopment (for example infectious diseases). It is an indicator that only describes, but does not posit the problem of not taking responsibility (preventive or curative) for the fact the health problems described are potentially avoidable, this gets people used to a way of thinking that ascertains and validates facts using medical terminology, but ignores all non-health related causes, i.e. the socio-economic variables.

The epidemiology of the burden of cardiovascular morbidity-mortality is – in the current literature – rigorously separated from that which describes poverty and the assertion that, in the absence of public social welfare and health systems, diseases are a "fate" which will only be averted when (the "when" is not specified) those diseases have entered the market economy

Thirty years after the Alma Ata Declaration (1978), the fact that it was never really applied has meant that lack of access to technologies (even to the least expensive) has been and is, an increasingly important factor in creating inequality, one which only amplifies already existing socio-economic inequalities. The culture of facts is evidently being applied with the same logic (with all the implications of avoidable morbidity-mortality which is never transformed into "avoided") in other sections of the GBD which are shown in tables and figures like those reported here.

From projections to reality

In this culture based on general extrapolations and facts, there are few examples of field studies that have been carried out on real populations; and those which check on the practicability of certain interventions are truly exceptions. Thus it would be useful to compare two examples from this literature to see whether, and if so, how, the interpretative hypotheses formulated so far are confirmed.

Table 2 is taken from a very recent publication which reports the results of an epidemiological study carried out (on the initiative of a group of independent researchers) in seven countries in Latin America[4]. The data confirm and quantify the

Table 2. Prevalence (% and confidence interval at 95%) of the main risk factors by capital city and by gender in Latin America.

	Barquisimeto	*Bogotà*	*Buenos Aires*	*Lima*	*Mexico City*	*Quito*	*Santiago*
Hypertension[1]	*24.7(22.7-26.8)*	*13.4(11.5-15.2)*	*29.0(26.9-31.1)*	*12.6(11.1-14.0)*	*11.7(10.3-13.1)*	*8.6(7.3-10.0)*	*23.8(21.6-26.1)*
Men	27.5(23.7-31.3)	14.6(11.9-17.2)	37.7(34.3-41.1)	14.4(12.2-16.7)	11.2(8.9-13.6)	7.2(5.6-8.7)	27.3(24.1-30.5)
Women	22.9(20.6-25.2)	12.4(10.2-14.4)	21.7(19.0-24.4)	10.7(8.8-12.6)	12.1(9.9-14.2)	10.1(7.8-12.4)	20.7(17.8-23.5)
Hypercholesterolemia[2]	*5.7(4.7-6.7)*	*12.0(10.5-13.5)*	*18.7(16.7-20.7)*	*11.6(10.1-13.1)*	*16.4(14.2-18.7)*	*20.2(18.0-22.3)*	*15.3(13.4-17.2)*
Men	4.5(3.0-6.1)	12.4(9.9-14.9)	19.6(16.8-22.4)	10.1(8.2-12.1)	17.5(14.4-20.7)	21.6(18.2-25.0)	15.9(13.3-18.5)
Women	6.5(5.0-7.9)	11.7(9.5-13.8)	17.8(15.1-20.5)	13.0(10.8-15.2)	15.4(12.3-18.5)	18.8(16.0-21.6)	14.8(12.2-17.4)
Smoking[3]	*21.8(19.3-24.2)*	*22.2(19.1-25.2)*	*38.6(36.0-41.2)*	*26.6(23.9-29.4)*	*27.3(25.0-29.5)*	*29.9(27.0-32.7)*	*45.4(42.8-47.9)*
Men	32.2(27.7-36.7)	31.3(27.1-35.5)	39.7(36.2-43.2)	38.0(34.2-41.7)	34.4(30.2-38.5)	49.4(45.9-52.9)	47.7(44.2-51.1)
Women	14.9(12.7-17.1)	15.0(11.1-18.9)	37.7(34.2-41.3)	15.4(12.6-18.2)	10.5(7.8-13.2)	10.5(7.8-13.2)	43.3(39.7-46.9)
Diabetes[4]	*6.0(5.0-7.0)*	*8.1(6.8-9.5)*	*6.2(4.8-7.7)*	*4.4(3.4-5.4)*	*8.9(7.7-10.2)*	*5.9(4.8-7.1)*	*7.2(5.9-8.6)*
Men	5.6(4.0-7.2)	7.4(5.7-9.2)	7.9(5.7-10.0)	4.3(2.8-5.7)	8.0(6.3-9.7)	4.6(3.2-6.0)	6.8(5.2-8.5)
Women	6.3(5.0-7.5)	8.7(6.8-10.6)	4.8(3.3-6.4)	4.6(3.2-5.9)	9.7(7.8-11.6)	7.3(5.6-8.9)	7.6(5.6-9.6)
Obesity[5]	*25.1(22.1-28.1)*	*18.0(15.7-20.2)*	*19.7(17.4-21.9)*	*22.3(19.9-24.6)*	*21.0(28.4-33.5)*	*16.3(14.3-18.3)*	*26.6(24.4-28.8)*
Men	23.5(18.8-28.3)	12.8(10.1-15.5)	23.1(19.8-26.3)	21.1(18.0-24.3)	31.7(28.0-35.4)	10.3(8.2-12.5)	23.6(20.4-26.8)
Women	26.1(22.6-29.6)	22.0(19.0-25.0)	16.8(13.8-19.8)	23.4(20.5-26.4)	30.4(27.1-33.7)	22.4(18.7-26.0)	27.4(26.0-32.9)
Metabolic Syndrome[6]	25.8(23.3-28.4)	20.4(18.2-22.5)	16.7(14.8-18.6)	17.9(15.9-20.0)	27.2(24.9-29.4)	13.7(11.9-15.6)	21.0(18.9-23.1)
Men	26.3(22.3-30.2)	18.7(15.8-21.6)	21.7(19.0-24.4)	15.8(13.0-18.6)	26.3(22.9-29.6)	7.5(5.6-9.3)	19.0(16.3-21.6)
Women	25.6(22.9-28.3)	21.7(19.0-24.4)	12.3(9.6-15.1)	20.0(17.3-22.8)	28.0(24.4-31.6)	20.1(16.9-23.4)	23.0(20.0-26.0)

[1] *Hypertension*: blood pressure ≥ 140/80 mmHg or use of anti-hypertensive drugs.
[2] *Hypercholesterolemia*: total serumal cholesterol > 240/dl.
[3] *Smoking*: daily consumption or occasional cigarette, cigar or pipe.
[4] *Diabetes*: level of fasting glycaemia ≥ 126 mg/dl or "self-reported" diabetes.
[5] *Obesity*: body mass index ≥ 30Kg/m2.
[6] *Metabolic Syndrome*: presence of 3 or more of the following conditions: abdominal obesity (diameter > 120 cm (men) and > 88 cm (women); level of triglycerides ≥150 mg/dl; cholesterol HDL < 60 mg/dl (men) and < 50 mg/dl (women; blood pressure ≥ 130/85 mm/Hg; fasting glycaemia ≥ 110mg/dl or "self-reported" diabetes.
Table modified by H. Schargrodsky et al., *Assessment of cardiovascular risk in seven Latin American Cities*, «Am J Med. 2008», 121, pp. 58-65.

prevalence, the characteristics, the distribution of cardiovascular risk factors reported in macro-statistics and the results of projections. The most important information however, is half concealed, hard to recognise as it is only mentioned, in passing, in the section on methods. The statistical sampling of the cases included in the epidemiological evaluations was very accurate, it had to be, so as to guarantee that the sample would be representative and to ensure that the study could, later, be published. (NB, even though this is the only study of its kind, it struggled to find a publisher. After more than a year of rejection slips from the major reviews (which never tire of publishing projection-fact type studies) it did appear in a journal that was well outside the mainstream of public health and epidemiology research, and even further away from the area of cardiovascular studies.

However, this banal note, slipped into the sophisticated presentation of the methodology says: sampling was only possible for urban populations, which could ensure the safety of the interviewers. This means that the samples are drawn from the populations of Latin American capitals (though it could be Africa or Asia); it is a strong indicator, but not of the real epidemiology of cardiovascular risk in that country, rather it is an indicator of each country's social stratification. The probable size and composition of the population that would have been considered "safe" to interview in these macro urban aggregates is so widely known as to merit no further comment. Here, once again: emphasis is being laid on risks, without any mention of avoidability: indeed less treatments are described than are recommended in the usual guidelines, probably, it is said, because of problems of compliance; but this explanation conveniently ignores the fact that these treatments would be largely inaccessible to many even in relatively privileged areas.

The culture of facts which reproduces an image but takes no responsibility for what it portrays, is a normal part of the culture of a selected, highly motivated group of cardiologists who embarked upon a decidedly harmful endeavour (one certainly not adequately repaid by their unconditional research grant, guaranteed by a multinational Pharmaceutical company, leader in the field of cardiology).

The second research scenario is a rural, marginal area in Ecuador, where hypertension appears to be the main component of a high risk cardiovascular profile. However, this result reflects experience gained in identifying problems which is transformed into "perspective adoption". These data were gathered over a long period (11 years) and are the formal evaluation of the results of a health care programme regarding events that were potentially avoidable (ictus, transitory ischemic event, myocardial infarction, congestive heart failure and kidney damage, vascular diseases and death)[5].

Subjects with hypertension were identified through two stratification methods. One method was based on the use of indicators that could be considered "essential", because they are also available in areas that are economically undeveloped, (such as checking blood pressure and analysis of the medical history of each patient which was recorded by non medical, voluntary personnel). The other was based on the guidelines proposed in 1999 by the WHO and the International Hypertension Society which assumed the use of some laboratory analyses and instruments that would be hard to find in developing countries, especially in rural areas.

The results (**Table 3**) reveal that if, when working in an area, one follows the community based organisational model proposed by the Alma-Ata Declaration that envisages assistance as being strongly participatory and based primarily on non-medical personnel, then the essential indicators for a cardiovascular risk profile will offer the same rate of predictive accuracy as that which the international guidelines say can be obtained with far more sophisticated diagnostic packages. However these latter, at least in the foreseeable future, will not be generally available to populations at risk in less economically developed areas. In this 'Alma Ata' scenario, successfully checking up on chronic conditions, e.g. hypertension, requires adequate patient compliance and is deeply dependent upon there being informed and motivated persons present, available and actively involved, not only doctors and nurses, but also volunteer workers and representatives from the community

Thus, underlying a community approach is a culture that does not stop at recognising that a problem exists but goes ahead and confronts it, thus offering proof that it is an avoidable and not an inevitable situation. The main technology required here is that of community training-participation, which requires minimum funding from non governmental cooperation.

The results obtained in the field of cardiovascular diseases reproduce the transferable efficacy of interventions that have already been tried out in the areas of the more "classic" diseases of under-development: for example, malaria, tuberculosis and river blindness.

Table3. Comparison between two prognostic methods for risk stratification of cardiovascular events in high and very high risk subjects, the former based on essential indicators (available even in less developed countries) and the latter on the guidelines set out by the WHO and the International Society for Hypertension (WHO-ISH).

Result	*Cardiovascular events*		*Total Mortality*	
Prognostic method for stratification	*"Essential Indicators"[1] (%)*	*Guide Lines WHO-ISHI[1] (%)*	*"Essential Indicators"[1] (%)*	*Guide Lines WHO-ISH[2] (%)*
Sensitivity[3]	77	78	67	69
Specificity[3]	66	63	64	60
Predictive accuracy[4]	67	65	64	61
Positive predictive value in high risk and very high risk subjects[4]	26	25	19	18
Negative predictive value in high risk and very high risk subjects[4]	97	96	96	96

[1] Essential Indicators: clinical history, blood pressure.

[2] Guide Lines (WHO-ISH): fasting glycaemia, total cholesterol, creatinine, urine analysis, electrocardiogram, patient's clinical history, blood pressure.

[3] Measures that indicate the validity of the method for correctly identifying those subjects who are reality hypertense: specificity; capacity of the method to identify healthy subjects.

[4] Measures that estimate, in terms of probability, the sick and the healthy who will be correctly identified in a population with a known rate of prevalence.

Table modified by G. Montalvo et al., *Diagnostic evaluation of hypertensives in a low-income country: a prospective field testing of an "essential" method of risk stratification* (article in publication now).

If cardiovascular disease were once again seen as a problem that can be confronted, one which does not automatically consign the individual to an implacable morbidity-mortality fate but rather one where answers can be sought and solutions tried, then this would ensure that the right to human dignity is respected, even when and where people and populations are not yet attractive for the market i.e. where people have yet to begin to consume the state of the art technological interventions which are profitable enough to excite, attract, the interest of the market.

Conclusions and prospectives

The cardiovascular sector is that in which, both in medical practise in our countries and in the literature, there is a tendency to show how much we know and what medicine can do to control-reduce the medical consequences of risk factors. The proposal, which may appear provocative, made in this brief contribution is that we should not see projections as fixed, unchangeable certainties, fixed frames of reference, but rather use them as a guide to discovering what we do not know and/or what is hidden, at the global and local level.

The probability, not high, that something will change in the impact of epidemiology and of public health recommendations on real access to the right to health depends (and cardiovascular disease is the model) on the possibility of passing from a description – ascertainment logic to one which takes on the burden of diseases and accepts that it is avoidable.

References

[1] J.L.C. Murray, A.D. Lopez (eds.), *The Global Burden of Disease. A comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020*, GBD Series vol. I. Harvard School of Public Health on behalf of the World Health Organization and the World Bank, Cambridge, Massachusetts 1996.

[2] J.L.C. Murray, A.D. Lopez *Global mortality, disability and the contribution of risk factors: Global Burden of Disease Study*, «Lancet» 1997, 349, pp. 1436-1442.

[3] S. Yusuf *et al.*, *Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study*, «Lancet» 2004, 364, pp. 937-952.

[4] H. Schargrodsky *et al.*, *Assessment of cardiovascular risk in seven Latin American Cities*, «Am J Med.» 2008, 121, pp. 58-65.

[5] G. Montalvo *et al.*, *Diagnostic evaluation of hypertensive in a low-income country: a prospective field testing of an "essential" method of risk stratification* (article being printed).