Cardiovascular health in migrants: current status and issues for prevention. A collaborative multidisciplinary task force report

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Objectives **To review information on cardiovascular health and migration, to stress the attention of researchers that much needs to be done in the collection of sound data in Italy and to allow policy-makers to identify this issue as an important public health concern.**

Background **In Italy, the rate of immigrants in the total number of residents increased from 2.5% in 1990 to 7.4% in 2010, and currently exceeds 10% in regions such as Lombardia, Emilia Romagna and Toscana.**

Methods **A consensus statement was developed by approaching relevant Italian national scientific societies involved in cardiovascular prevention. Task force members were identified by the president and/or the boards of each relevant scientific society or working group, as appropriate. To obtain a widespread consensus, drafts were merged and distributed to the scientific societies for local evaluation and revision by as many experts as possible. The ensuing final draft was finally approved by scientific societies.**

Results **In several western European countries, the prevalence of hypertension, diabetes, chronic kidney disease, obesity and metabolic syndrome was found to be higher among immigrants than in the native population. Although migrants are often initially healthier than non-migrant populations in their host countries, genetic factors, and changing environments with lifestyle changes, social exclusion and insufficient medical control may expose them to health challenges. Cultural reasons may also hamper both the dissemination of prevention strategies and migrant communication with healthcare providers. However, great diversity exists across and within different groups of migrants, making generalizations very difficult and many countries do not collect registry or survey data for migrant's health.**

Conclusions **In the present economic context, the European Union is placing great attention to improve data collection for migrant health and to support the implementation of specific prevention policies aimed at limiting the future burden of cardiovascular and renal disease, and the consequent load for health systems. Wider initiatives on the topic are awaited in Italy.**

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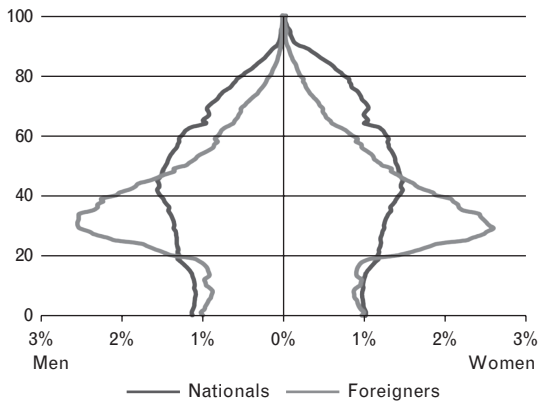
Introduction

Europe, a source of emigrants in the 19th century and first half of the 20th century, is now a net recipient of migrants.[1] In 2010 there were 47.3 million foreign-born residents in Europe, corresponding to 9.4% of the total population (Fig. 1).[2] Germany, France and the United Kingdom are the Member States of Europe with the highest numbers of immigrants.[3] However, the migrant influx to these countries from 2001 has become relatively modest compared with Spain and Italy where the percentage of international migrants as a percentage of the population increased from 2.1 and 2.5% in 1990 to 14.1% and 7.4% in 2010, respectively.[3]

In Italy, migrants are an expanding global population of growing social, demographic and political importance. The rate of immigrants in the total number of residents currently exceeds 10% in regions such as Lombardia, Emilia Romagna and Toscana.[4] The incidence is higher among minors (1 million) and among young adults (18–44 years), with consequent higher visibility at school (over 700 000) and on the labor market (over 2 million). According to 'The Immigration Statistics Dossier 2011'[5] the foreign workers currently account for one-tenth of total employment. Foreigners, in fact, have a younger average age than Italians (32 years against 44 years for the total population),[1] with an incidence of 22.0% of minors (5.1 percentage points higher than the average) and people of working age of 75.7% (10 percentage points higher), whereas among the migrants people aged 65 years and older are only 2.4% (minus 17.9 percentage points).

Fig. 1



Population age structure by citizenship in Europe (EU-27, 2010).[2]

Similar age distribution was recorded in other European countries. Probably because of the young age of migrants, the attention of most European member states on migrant health is mainly focused on emergency care. Italy is one of the five countries (the Netherlands, France, Italy, Portugal and Spain) with explicit entitlements for specific services (e.g. primary care, maternity care), and/or for specific groups (e.g. children, pregnant women). In Italy, the pursuit of employment or registration as unemployed (current employment centres) give to foreign citizens legally resident (regular immigrants) the right of compulsory registration to the Servizio Sanitario Regionale (SSR).[6] Those regular immigrants residing in Italy for a period exceeding 3 months (for study, au pairs, religious personnel), who are not entitled to compulsory registration, are required to insure against the risk of sickness, accident and maternity benefits, by entering into an insurance policy with an Italian or foreign insurance company, valid on the national territory or, alternatively, they may request voluntary registration to SSR, against payment of a contribution. Undocumented migrants in Italy are entitled to receive: emergency care, maternity care until 6 months postpartum, children's care and care and prevention of infectious diseases (including HIV and tuberculosis and children's vaccination among others). Undocumented migrants will be normally requested to pay a user's fee unless he/she officially declares to be poor and unable to pay. In this case, care is provided free of charge. Only four European Member States (the Netherlands, France, Portugal and Spain) offered undocumented migrants access to the same range of services as nationals of that country as long as they met certain preconditions, such as proof of identity or residence.[3,7–9]

Disparities often exist between a migrant population's place of origin and its destination, particularly with relation to health determinants.[10] Migration across health and disease disparities may influence the epidemiology of certain diseases globally and in nations receiving migrants. Traditionally, migration health activities have been focused on the recognition, identification and management of communicable diseases such as tuberculosis, leprosy or syphilis at the time and place of the migrant arrival.[11] These border control practices were designed for national application through policies of exclusion and lack an integrated international perspective. Current dynamics of migration and rates of population mobility are indeed creating new health challenges for existing policy.[8,12] Non-communicable diseases (in particular diabetes and hypertension) have sharply increased during

the last decades in the poor areas of the planet where culture of prevention is not yet spread at population level.[13] Lifestyle-associated health issues, including tobacco use and alcohol consumption, as well as the lack of implementation of prevention strategies among the migrant communities may also importantly affect the long-term consequences of movement between locations with different health determinants.[12,14,15] Early studies performed mainly in Great Britain and the Netherlands revealed an increased risk of type 2 diabetes, hypertension[16–18] obesity and metabolic syndrome in some ethnic minority groups. Cultural reasons may obstacle the dissemination of prevention strategies among immigrants, and communication between healthcare providers and migrant clients remains poor. In the present European economic context, the lack of implementation of specific national migrant health prevention policies can thus increase the burden of cardiovascular (myocardial infarction and stroke) and renal disease (dialysis) in the next few decades.[19]

Migrants from low and middle-income countries (LMIC) may also develop cardiovascular complications in the medium to long term as a consequence of the natural history of disease acquired in native countries and almost forgotten in Europe. The issue is relevant for rheumatic heart disease, which remains a major burden in different areas of the world.[20–22] To be effective in the long term, the management of health issues resulting from population mobility will require an integration of national and global health initiatives.[23] For medical knowledge to improve health, health workers and patients need to hear about it, and prevention strategies and relevant treatment must be available and used appropriately. The aims of the present collaborative multidisciplinary initiative report are to collect information on different aspects of health and migration to make the health services research community and policy-makers more aware of the potential future consequent load for health systems, and to stress the importance of improving data collection for migrant health in Italy.

Health status of migrants and ethnic populations

Hypertension and stroke

Consistently, high mortality and incidence stroke rates have been observed for migrants of West African origin. Age-standardized and sex-specific stroke mortality rates for 1979–83, 1989–93 and 1999–2003 were higher for all migrant groups in each time period. More precisely in 1999–2003, stroke mortality was almost 200% higher among male migrants from West Africa, and almost 100% higher among those from the Caribbean.[24] These findings bear similarities with the high stroke mortality of black Surinamese and Antillean-born residents in the Netherlands, and the higher stroke mortality of black people in the United States.[25,26] This pattern has been attributed to high rates of hypertension among people of western African origin. There is consensus that among people of African origin hypertension is three-fold to four-fold more prevalent than in the European population.[16,18,27–32] This is true for men and women and is present at any age, at least in adulthood. Finally, the higher rates of hypertension in people from African descent in Europe are confirmatory of the USA African-American and white comparisons.[17,33,34]

It is uncertain whether this is mostly because of genetic or environmental factors.[35] A predominant role of the environment is suggested by studies that found a higher prevalence of hypertension of West African migrants compared with people in their countries of origin.[27] Body weight and sodium intake increases were found to be the main determinants of blood pressure (BP) increase in subjects who migrated to Israel and Italy from Ethiopia[36] and Somalia,[37] respectively. More precisely, 30% of normotensive people migrated to Italy from Somalia were hypertensive after a 6-month stay in Florence.[37] In the same subjects, a reduced sensitivity of the afferent pathway of the cardiopulmonary reflex with resultant defective inhibitory afference to the sympathetic outflow was also shown.[38] Sodium sensitivity and the reduced response of the afferent pathway of the cardiopulmonary reflex[38] are in agreement with the better response of hypertensive blacks to calcium blockers and diuretics than to ACE inhibitors and β-adrenergic blockers.[39] Further studies evaluating the efficacy of tailored dietary and pharmacologic treatment in ethnic minorities living in Europe are needed. The importance of genetic factors associated with hypertension in African blacks is also evident because differences in BP and hypertension prevalence between ethnic groups are known to exist.[40] Chinese-origin people have slightly higher BP and prevalence of hypertension than white individuals.[41,42] Overall in South Asians, BP values were found to be similar, but there is heterogeneity among subgroups living in the same European country,[17] and between the same subgroups living in different European countries.[30,43] Increased stroke mortality levels in ethnic minorities[24] may also be partly linked to other factors, such as problems in timely diagnosis and care for patients with hypertension or stroke. Although the evidence on this issue is still inconclusive, there are indications of ethnic differences in the control and treatment of high BP.[16,30,43]

Ischemic heart disease

Fischbacher *et al.*[44] examined the incidence of fatal and non-fatal myocardial infarction through a record-linked, retrospective cohort study of 4.6 million people that linked individual ethnic groups from the 2001 census to Scottish hospital discharge and mortality data from 2001 to 2003. The incidence of acute myocardial infarction (fatal combined with non-fatal) was higher in South

Asian compared with non-South Asian men, with a similar picture reported in women. Forouhi *et al.*[45] found a higher incidence of coronary death in South Asian men recruited in west London compared with European men. Trends in coronary heart disease (CHD) mortality in migrants to England and Wales were recently investigated using anonymized death records for 1979–83, 1989–93 and 1999–2003.[24] In all three time periods, compared with men born in England and Wales, men born in Jamaica, other Caribbean countries, or West Africa had significantly lower coronary mortality, whereas those born in East Africa, India, Pakistan or Bangladesh had higher mortality. Although there was a general pattern of decline in age-standardized and sex-specific death rates between 1979 and 2003, the declines were smaller for many migrant groups than for people born in England and Wales.[24] As a result, the groups with mortality higher than people born in England and Wales remained consistently so over the period. The disparity increased for coronary mortality in men born in Pakistan and Bangladesh. Other English studies confirmed the high rates of CHD mortality among residents born in the Indian subcontinent.[24,46] A striking feature of these trends is the erosion of low coronary disease mortality in some groups. Women from Jamaica and men from Hungary now have coronary death rates higher than those born in England and Wales. In all of these groups, modifiable risk factors such as smoking, obesity and lack of sufficient physical activity are related to cardiovascular risk.[24] Likewise in Sweden, the incidence of myocardial infarction was 50% higher among men born in south Asia, being 20–30% lower among men born in North Africa.[47] Similar patterns are observed in other European countries.[48–51] The causes of the higher CHD rates are still uncertain, and may also be related to genetic factors. South Asian migrants have greater CHD risk at similar levels of body mass index.

Cultural difference in symptom presentation needs to be recognized by clinicians if mortality rates in this high-risk group are to be reduced. Over 18-year follow-up of London healthy civil servants in the Whitehall II study, South Asians had higher cumulative frequencies of angina (17.0 vs. 11.3%, $P < 0.001$) compared with white individuals.[52] However, South Asians are less likely than White British to present with classic symptoms of myocardial infarction, and some argue that this makes diagnosis difficult and possibly delays essential treatment. Bangladeshi patients with acute myocardial infarction often present with atypical symptoms, which may lead to slower triage in the casualty department and delay in essential treatment.[53] Design of health services must indeed recognize differential presentation according to ethnicity to improve access. This was highlighted by a UK study using the Rose Angina questionnaire, which has been extensively used in different cultural settings and epidemiological studies of CHD. In this study, Fischbacher *et al.*[54] found that definite Rose angina showed lower sensitivity for other measures in South Asians than in Europeans: sensitivity for a doctor's diagnosis was 21% in South Asian and 37% in European men. Thus, the performance of the Rose angina questionnaire was sufficiently inconsistent to warrant further work to achieve greater cross-cultural validity.

The impact of differential access to healthcare on ethnic differences in cardiovascular mortality is unclear. Current recommendations for primary prevention of CVD in high-risk subjects include the use of antiplatelet therapy (aspirin), β-blockers, ACE inhibitors and statins. In general, there are limited data in relation to different effectiveness in the ethnicity, although there are some data in relation to different usage of these drugs, or uptake of prevention measures. For example, an audit of primary care angina management in England[55] reported smoking cessation advice in 97.1% of white Europeans, compared with 46.0% of non-white subjects. Beta-blocker use, as well as weight and exercise advice, was less common among non-white subjects. More data are available in the non-UK setting. Brown *et al.*[56] reported that African Americans and Hispanics are less likely to take aspirin than their white European counterparts, and this was not accounted for by differences in sociodemographic characteristics and CVD risk factors among ethnic minorities.

Diabetes and overweight

With few exceptions, diabetes mellitus incidence,[57] prevalence[58–60] and mortality rates[25,61,62] are much higher among migrants than among locally born residents. In the Netherlands, diabetes mellitus prevalence rates were two times higher among migrants (i.e. those born in Turkey, Morocco, Suriname or the Antilles) than among the locally born population.[63] Even larger differences were observed in terms of diabetes mellitus mortality (i.e. deaths for which diabetes mellitus was identified as the 'underlying' cause of death), with three times higher rates among migrant men, and four times higher rates among migrant women compared with the locally born population. Migrants of Surinamese origin had the highest prevalence and mortality rates.[25] Although the higher CAD mortality rates in migrants are closely linked to higher diabetes mellitus prevalence rates,[25] differences in case fatality might also play a role. However, direct evidence on case fatality among migrants in Europe is scarce. In an English follow-up survey diabetic patients from South Asia had higher diabetes mortality rates than European diabetic patients, especially at younger ages.[57] Using mortality data, a European study reviewed the extent to which diabetes mellitus mortality was more common among migrants.[61] The study considered data on 30 migrant groups in seven European countries. For the majority of migrant groups, diabetes mellitus mortality was found to be much higher than for locally born residents. On average, diabetes

mellitus mortality among migrants was 90% higher for men and 120% higher for women. These findings illustrate that among non-communicable diseases with sufficient data available, diabetes mellitus is the only disease that is much more common in virtually all migrant groups[61] (Table 1).

According to the Health Survey for England,[64] the prevalence of diabetes among migrants was more than five-fold that of all women and increased by 16% (compared with 2% for all women) among women aged 55 years and older. However, few national data source of risk factor exposures for ethnic groups are available. Prevalence of diabetes mellitus is closely linked to overweight and obesity. The prevalence of overweight including obesity in Bangladeshis, although lower than for the general population, increased between 1999 and 2004 by 8% for men and 14% for women (compared with 4% for all men and 3% for all women), and the prevalence of diabetes was highest in Bangladeshi men, four-fold that of men in general, in both years. High prevalence of diabetes and obesity were also observed in migrants from the middle East area.[65–68] A certain susceptibility to insulin resistance and abdominal adiposity, the intrauterine environment and biological imprinting all act synergistically to increase the risk of diabetes mellitus in migrant populations.[69] In addition to genetic predisposition, there are several other interacting causes of the increased diabetes mellitus risk of migrants, including changing environments and insufficient medical control.[70,71] Metabolic control is poor among migrant groups with diabetes, and HbA1c (the amount of glucose that is being carried by the red blood cells in the body) in migrants is generally higher than in the locally born population, increasing the risk of diabetic complications.[72] A more general explanation suggests that migrants' excess diabetes mellitus mortality is due to a dramatic change from a poor to an affluent environment.[60] Lifestyle factors that are thought to be involved include both physical inactivity and unhealthy diet.

Table 1 MMRs by country-of-birth groups in Europe adjusted for age and diabetes mortality level of countries of residence[61]

	Age and country-adjusted MRRs[a]	
Regression model	Men MRR (95% CI)	Women MRR (95% CI)
All migrants	1.9 (1.8–2.0)	2.2 (2.1–2.3)
North African[b]	1.4 (1.3–1.4)	1.7 (1.5–1.8)
Turkish	1.7 (1.4–2.0)	2.1 (1.7–2.6)
South Asian	3.7 (3.4–4.0)	4.4 (4.0–4.9)
GDP of COB		
1Q (<$2400)	3.8 (3.5–4.2)	3.9 (3.4–4.5)
2Q ($2400–$5300)	2.8 (2.6–2.9)	3.5 (3.2–3.7)
3Q ($5300–$9500)	1.8 (1.7–2.0)	2.2 (2.0–2.4)
4Q (≥$9500)	1.0 (0.9–1.2)	0.9 (0.8–1.1)

CI, confidence interval; COB, country of birth; GDP, gross domestic product; Q (1Q–4Q), quartile (first–fourth quartile); MMR, mortality rate ratio. [a] Derived from Poisson regression model with local-born populations as reference category. [b] Refers to migrants originating either from Algeria, Egypt, Libya, Morocco, Sudan or Tunisia.

Their joint effect is to raise the prevalence of overweight and obesity in many migrant populations as compared with locally born residents.[60,73] Obesity may be especially important as a factor contributing to increased insulin concentrations and decreased insulin sensitivity, underlining the need for migrant-sensitive health promotion activities.[74,75] However, higher rates of obesity and diabetes in ethnic minority groups in European countries are not fully explained by traditional risk factors (obesity, adiposity, diet and physical activity cannot explain this risk of diabetes).[76,77] A better understanding of why this risk is increased is imperative in order to develop interventions and policies specifically in those populations.[76]

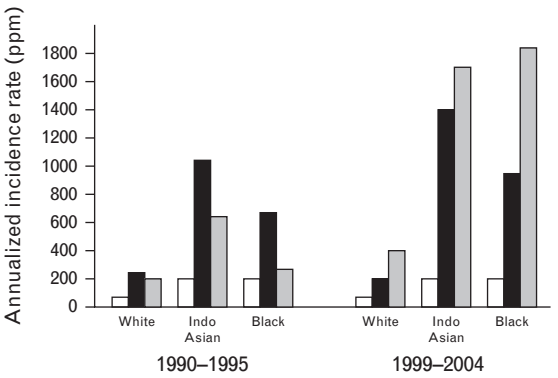
The high prevalence of diabetes mellitus among migrants in Europe is also crucial for the design of screening strategies. According to a survey conducted in Amsterdam in 1999–2000,[78] the high prevalence of diabetes mellitus among Hindustani Surinamese (25.6%) and to a lesser extent among African Surinamese (12.7%) (Dutch 6.8%) suggests that universal rather than selective screening may be indicated. If a choice for selective screening is made however, an ethnicity-specific approach is required.

Renal disease

In the United Kingdom, the incidence of end-stage renal failure among individuals from ethnic communities is three to five times greater than among white Caucasians.[79,80] High incidence rates in age-specific ethnic groups were observed for the whole of England (data from 1991–1992),[81] and for the Coventry population (1992–1995 rates).[82] The review of the London Thames area population in the early 1990s[83] also revealed that the relative risk of renal replacement therapy (RRT) for Asians compared with white patients aged 16–54 years was 3.0, and rose with age to 8.0 for those aged over 65 years. A similarly alarming picture was seen nationwide.[51] The high incidence rates in age-specific ethnic groups observed in the years 1990–1995 were recently confirmed for the years 1999–2004.[84] There was a consistent increase of ~40% in all ethnic groups between the 1991 and 2001 cohorts (Fig. 2).[84] The increase in patient numbers was because of rising ethnic minority populations and increasing acceptance rates, especially in the elderly. Higgins *et al.*[82] did not observe difference in the proportions of white Europeans and Indo-Asians receiving dialysis or placed on a waiting list for transplant surgery. However, proportionately more Indo-Asian patients, relative to white Europeans, started dialysis and were waiting for kidney transplantation,[85] and 33% of Indo-Asians remained on the waiting list for more than 2 years without receiving a transplant, as compared with 19% of white Europeans ($P < 0.025$). The take-on rate is likely to rise disproportionately as the migrant population ages over the next 10 years.

Organ donation was lower in the Indo-Asian population than in the white European population, with 40.1 kidneys

Fig. 2



Annualized incidence rates for renal replacement therapy by age and ethnicity (white, Indo-Asian, black) in the adult population of Birmingham Health Authority in two 5-year periods (1990–1995 and 1999–2004) using the 1991 and 2001 UK population census datasets and local programs data.[84]

donated per million population per annum among white Europeans, compared with 9.3 among Indo-Asians. Factors leading to a low rate of organ donation included age distribution, the low number of Indo-Asians admitted to intensive care and religious views about organ donation from cadavers.

Knowledge of outcomes of RRT in ethnic minorities has been very limited. A study of Indo-Asians from Bradford, United Kingdom, raised the possibility of worse long-term outcomes after renal transplantation in this group compared with non-Asians, owing to a higher rate of death with graft function.[86]

Patterns of renal disorder and the cause of renal failure are different in Indo-Asians compared with Caucasians, with higher rates of diabetic nephropathy, interstitial nephritis and focal segmental glomerulosclerosis.[80,87,88] Two studies did suggest that idiopathic interstitial nephritis as well as focal, segmental glomerulosclerosis, chronic pyelonephritis and systemic lupus erythematous was over-represented in this group.[79,80] UK studies have demonstrated a significant correlation between the incidence/prevalence of RRT and social deprivation.[89,90] Large studies in Australia, New Zealand and the United States have also demonstrated this link.[91,92] The effect of deprivation is complicated by the association this has with ethnicity. The UK Renal Registry published data in 2003 showing a clear association between deprivation and ethnicity.[93] Healthcare practitioners should also be aware of the high prevalent use of alternative therapies and should be proactive in obtaining this information from patients.[94]

The issue of reducing the excess renal disease and renal failure in ethnic communities needs to be addressed at several levels.[95] Interventions are classified as highly cost-effective (the cost of the intervention per disease adjusted life-year saved is less than the gross domestic product per person), cost-effective (one to three times the gross domestic product per person) or not cost-effective (more than three times the gross domestic product per person). Screening for chronic kidney disease is cost-effective in people with diabetes (selective screening), whereas cost-effectiveness of screening for chronic kidney disease in the general population is unclear.[96] Data are insufficient, however, to make generalizations especially to immigrants from LMIC. The integration of screening for chronic kidney disease with cardiovascular health programs might indeed increase health awareness among migrant communities.[97–100] Several recent studies are providing evidence that most forms of renal impairment can be prevented or delayed.[101,102] It is thus important to ensure that best practice with respect to BP and diabetes care is implemented for all patients.[102,103]

Issue for prevention

In spite of the unprecedented scientific advances in biomedical research over the past several decades, many under-served communities in the developed nations have not benefited equally. A complex interaction of genetic, biological, cultural and socioeconomic factors seems to be responsible for a significant proportion of the health disparities in many communities.[104]

A number of studies have revealed important barriers in healthcare access.[105,106] According to a recent retrospective analysis of administrative healthcare records in Italy, all quality management indicators for diabetes, heart failure, and ischemic heart disease were lower for citizens from high-pressure migration countries than for citizens from highly developed countries and Italians.[107] Furthermore, people from high-pressure migration countries were also more likely to contact emergency services and less likely to visit specialist doctors or use preventive care.[107] Importantly, patients from highly developed countries did not differ from Italians in their adherence to disease management schemes. Generally, the impact of the culture of origin diminishes with increasing length of stay.[108] Although the increased risk of developing CHD declined somewhat in second-generation Finnish immigrants in Sweden, the persisting risk suggests the combination of environmental and genetic factors.[108,109]

Effective communication is essential in establishing a diagnosis and treatment plan.[110] Although it is well recognized that our ability to provide optimal care importantly relies on our communication skills, cultural differences between the physician and the patient may create communication barriers so significant that our patients leave the office not knowing what we are telling them. Culture has been defined as 'beliefs and behaviors that are learned and shared by members of a group'.[111] Gestures are not universal; personal space, the space between individuals during a one-on-one private

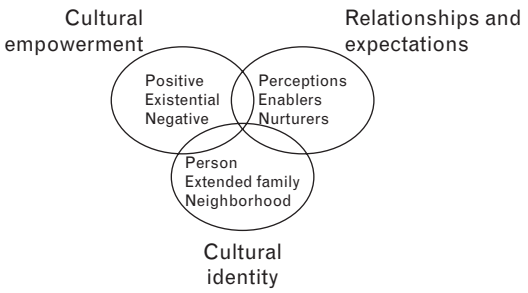
conversation, is much closer in many cultures (i.e. Latin American or Middle Eastern); direct or prolonged eye contact with the patient may be thought to signify disrespect causing unnecessary miscommunications.[110] The way a patient experiences his or her biomedical ailment is also influenced by specific cultural norms, or personal health belief systems. As a consequence, certain conditions may be 'acceptable' or even desired. In low-income countries, women have high odds of obesity and abdominal obesity.[98] The importance of culture is evident because gender differences start at puberty.[112] Abdominal obesity was found in nearly 80% of Iranian women living both in Iran and in Sweden.[32] Likewise in the Netherlands, the prevalence of central obesity was higher in women than in men, sex differences being particularly larger in ethnic minority groups, especially in African-Surinamese than in white Dutch.[113] Given the beneficial effects of physical activity on weight reduction, promotion of physical activity may help to bridge the sex gap in the metabolic syndrome, particularly in ethnic minority women in whom obesity is highly prevalent, but physical activity levels are low.[113] Investment in women's education may present an important long-term investment in obesity prevention.[114]

Even while attempting to learn about specific cultural norms, the dangers of stereotyping need to be acknowledged, realizing that factors such as socioeconomic status, educational level, occupation and family values and belief systems may have as important a role in determining culture as does ethnicity.

The efficiency of prevention strategies implementation among immigrant communities requires special consideration of the importance of the social issue. By outlining an approach that examines health beliefs, decisions and behaviours within the context of culture, the Perceptions, Enablers, Nurturers (PEN-3) model seeks to empower communities through their intrinsic positive and unique qualities so that culturally appropriate interventions can be planned, implemented and evaluated.[115–118] The PEN-3 model consists of three interrelated domains: cultural empowerment, relationships and expectations and cultural identity. Each of the domains consists of three components (Fig. 3). The first two domains, cross-tabulated in a 3×3 table,[115,119] serve as the assessment tool kit to inform the intervention, whereas the last domain, cultural identity, determines the point of entry or entries for intervention (person, extended family and/or neighbourhood, i.e. community including entities such as the healthcare system), thereby increasing its effectiveness. The intervention should thus not be focused only on the individual but rather on the context and community, otherwise change may not be sustainable.

Less is known about the enabling factors, whereas insight into these is equally important in generating solutions to enhance healthcare access, CVD prevention and BP

Fig. 3



The Perceptions, Enablers, Nurturers (PEN-3) model.

control. In line with this, intervention efforts should be sensitive to the sociocultural contexts of communities in order to be effective. Television has the remarkable potential to influence people's behaviours and norms. When used for good, television can sometimes have an even bigger positive impact than a doctor's advice. For the migrant populations, such information might give insights into how exposure to different environmental situations might influence their health outcomes.

Conclusion

Changes in lifestyle and diet habits following urbanization are greatly contributing to increase the prevalence of hypertension, obesity, diabetes[13,120–122] and kidney damage[123,124] in LMIC. The effects of these global changes are now perceived also in Italy where although information regarding cardiovascular risk in migrants is scarce, the retrospective analysis of administrative healthcare records has been indicating that diabetes and hypertension are more prevalent among some ethnic minority groups than European descents.[107] The aging of ethnic minority populations can lead to a future burden of cardiovascular (myocardial infarction and stroke) and renal disease (dialysis) in the next few decades, which will increase local need for health services significantly. Therefore, in Italy, much needs to be done especially in the collection of sound data, which is the first step to allow central governments identifying this issue as an important public health concern. Specific measures to control diabetes, hypertension and secondary complications in susceptible populations will contribute both to safeguarding health and to economies in care spending. Healthcare professionals have a crucial role to play here.

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