



Joint meeting between the Belgian Nutrition Society, The Nutrition Society and Société Française de Nutrition was held at the Faculté de Médecine, Lille on 28–29 May 2013

Conference on ‘Sustainable diet and food security’ Symposium 5: Cultural diversity of sustainable diets

Nutrition transition and food sustainability

Rekia Belahsen

Chouaib Doukkali University, Training and Research Unit on Nutrition & Food Sciences, Laboratory of Biotechnology, Biochemistry & Nutrition, El Jadida 24000, Morocco

The aim of the present paper is to review nutrition transition (NT) ongoing in low and middle income countries and the associated dietary changes. NT is accompanied by demographic and epidemiological transition associated with economic development and urbanisation. In these countries, while the problems of hunger and undernourishment persist, there is an escalation of diet-related non-communicable diseases; making them face both problems of malnutrition, under and overnutrition. Indeed, in addition to protein energy malnutrition underweight and micronutrient deficiencies affect a high proportion of children and women. Conversely, changes in dietary habits and physical activity patterns have led to emergence of chronic diseases such as obesity, diabetes, hypertension, stroke, hyperlipidaemia, CHD and cancer. One possible explanation of weight gain and its associated health consequences is the trend of the consumption of already prepared meals and the restaurants that are in continuous development leading to high consumption of foods rich in sugar and fat. The health problems associated with NT have not spared populations in the Mediterranean area where the type of diet is reported to be healthy and to protect against cardiovascular risks. This is seen in North Africa that belongs also to the Mediterranean basin, where the nutritional situation raises the problem of traditional foods sustainability. Accurate nutritional policy and education are needed to redress the effects of malnutrition related to NT on health.

Transition: Nutrition: Demography: Epidemiology: Food sustainability

The nutrition transition

Globalisation is associated with food changes and various phenomena that accompany the transition to modernity including transfer of goods and cultures⁽¹⁾. In terms of health, it is accompanied by a replacement of infectious diseases as the main cause of death by a gradual and continued rise of chronic and degenerative diseases. In the field of nutrition, there is also a substitution of overweight and obesity problems for dietary deficiency-related diseases⁽²⁾. This new global phenomenon is widely studied and its management will pose a major challenge for public health policy in the coming years.

In this paper, the purpose is to examine some determinants of the nutritional transition and dietary changes accompanying them in developing countries.

Improvement in food production has led to food abundance and poverty reduction over the past few decades. The result is a decrease of malnourished people in many developing regions in the world⁽³⁾. However, despite the progress made, a significant number of people are still suffering from hunger and malnutrition with related health consequences. This is seen in the countries where the poor population has increased since 2008 because of the financial and economic crisis^(4–6). Indeed, besides the problem of insufficient protein and energy intake, there are many micronutrient deficiencies such as iron, iodine and vitamin A in millions of people in poor and middle-income countries including Africa.

Abbreviation: NT, nutrition transition.

Corresponding author: Rekia Belahsen, fax 212 523 34 21 87/44 49, email b.rekia@gmail.com

The nutrition transition (NT) that is ongoing in these regions over the past two decades is one facet of a more general demographic, nutritional and epidemiological transition that accompanies development and urbanisation.

Passing from a rural to an urban lifestyle is marked by changes in dietary habits and physical activity patterns. These changes have led to a rapid increase in the prevalence of an emerging problem of malnutrition: overweight and obesity⁽⁷⁾ related to unhealthy diets and lifestyles among the poor people in these countries^(8,9), associated with a high prevalence of CVD risks. With these changes induced by the accompanied epidemiological transition there is a shift from nutrient deficiency and infectious diseases characterising poor populations to the problems of chronic diseases namely obesity, diabetes, hypertension, stroke, hyperlipidaemia, CHD and cancer. These types of health problems were in the past characteristic of rich societies. The nutritional situation in the countries in transition generates profiles with different stages of declining undernutrition and increasing overnutrition or the coexistence of both under- and overnutrition even in the same household⁽¹⁰⁾.

Demographic transition

Despite the decline in population growth, population development is in continuous increase. It is predicted to grow by 2050 in countries where NT was reported such as the Middle East and North Africa, Africa, Asia and Latin America.

This population development is also combined, because of the progress in health, with a significant decrease in child mortality and a relatively slow onset of fertility and increasing life expectancy^(11–13). The existing level of malnutrition and the increasing population in many countries of Africa, the Middle East and Asia will have a major impact on the strategies required to meet the future global food and nutrient needs⁽¹⁴⁾. Other challenges that will require increasing attention are geriatric nutritional problems due to the increase of expectancy and non-communicable diseases.

Another aspect of the transition is urbanisation that is growing rapidly in almost all developing countries⁽¹⁵⁾. In all countries in Africa and Middle East and North Africa regions for instance, urban population is more than 50%. In Morocco, it already achieved more than 55% in 2004 and it is predicted to rise^(16,17).

Epidemiological transition

In developing countries with different incomes, there is evidence of a triple burden of malnutrition, with the improvement of economic conditions. In these countries, while they are still struggling with undernutrition and infections, emerging problems of overnutrition such as obesity and diet-related non-communicable diseases are increasing. Since in most of these countries there is no available operational programme to address nutrition-related chronic diseases as the existing programmes are focused on the reduction of undernutrition, the consequences are to be of significant health and

economic impact in the future. Non-communicable diseases, when combined with certain risk factors such as smoking, lack of physical activity, hypertension, hypercholesterolaemia, glucose intolerance, diet and obesity, lead to the onset of CVD and cancer. All these diseases which were characteristic of westernised societies in the past, are now emerging as a major health problem in developing and middle-income countries. One of the leading risk factors for these diseases is obesity caused by the NT. The increase of obesity prevalence has been well documented in the developed countries; however, with NT it is also increasing in developing countries including countries in Africa and Mediterranean area where a rapid change in the patterns of diseases is evident and now accepted by WHO and national governments. Besides, CVD metabolic syndromes are also emerging as a major health concern in these countries⁽¹⁸⁾. This syndrome was also characteristic of Western societies in the past and its high prevalence has been documented in developed countries. The majority of metabolic syndrome components are also reported to be related independently to lifestyle factors namely diet, weight control and physical activity that are also accompanying NT⁽¹⁹⁾.

As consequences of NT, the food and nutrition situation show that despite efforts made in many regions, populations are still facing malnutrition and hunger. Indeed between 2000 and 2005, there is an increased number of undernourished and overweight children, concentrated in Africa and Asia^(20,21). Also, moderate and severe forms of stunting and underweight are still highly prevalent especially in South Asia^(22,23). Meanwhile, in addition to protein–energy malnutrition, more than 2 billion people in the world are affected by micronutrient malnutrition particularly iron, iodine, vitamin A and zinc deficiencies⁽²⁴⁾. In Sub-Saharan Africa and in Asia iron deficiency anaemia affects more than half of the children and women populations and in North Africa only, about 33 million people are suffering from iodine deficiency⁽²⁵⁾. Another problem is vitamin A deficiency that affects more than 40% in the developing world⁽²⁶⁾, with a prevalence and severity highly concentrated in South and Southeast Asia and Africa⁽²⁷⁾.

At the same time, the problem of overnutrition is emerging in low- and middle-income countries affecting all age categories and adding another burden of malnutrition beside that of undernutrition. Indeed, more than 500 million adults have obesity affecting more women than men and 43 million preschool children are overweight with high rate in North Africa⁽⁷⁾. The continuous increase of obesity is associated with health consequences leading to high prevalence of CVD risks such as hypertension, diabetes, dyslipidaemia and metabolic syndrome and affecting even Mediterranean countries^(19,24,28–31).

Several factors associated with the ongoing transition, explain this widespread obesity namely accelerated processes of urbanisation, unhealthy lifestyle leading to physical inactivity or sedentary and dietary habit changes. In North Africa for instance, the prevalence of physical inactivity was estimated as 32% of the population of those aged 40–69 years in Tunisia, 26% of the population of those aged 25–64 years in Algeria and,



52% of the population aged 20 years and older in Egypt⁽³¹⁾. Sedentarity was reported to be associated with higher prevalence of obesity in women⁽¹⁹⁾. Another factor of obesity is the increase of food availability and food energy supplies that lead to a food energy consumption greater than the needs⁽²⁰⁾. The later factor is among the determining factors of obesity and CVD trends^(32,33) and to CVD risks in North Africa and elsewhere⁽³⁴⁾.

Dietary transition in Mediterranean countries

Within the global transition there is also a change in diet in association with the changes accompanying the demographic transition. Indeed, regardless of the region diet is passing from a traditional to a westernised pattern. One example is in North Africa that belongs to Africa but also to the Mediterranean basin. The diet in this area is based on a large consumption of cereals and tubers, mainly wheat replacing barley, the traditional grains and consumption of fruit and vegetables. The consumption of animal products including fish remains very limited in this region. In urban households and high socio-economic category in particular, food becomes more diversified and rich in micronutrients with the improvement of economic situation⁽³⁵⁾. However, in Morocco and Algeria, two countries of this region, the actual daily dietary fibre intake is lower and that of saturated fat is higher when compared to the traditional Mediterranean diet. Also, in Algeria <30% of the subjects meet the recommendations for fat, carbohydrates and fibre.

In these countries, NT is also linked to a shift from a traditional Mediterranean dietary pattern that was marked by the use of traditional and local foods to a pattern characterised by food abundance, raised consumption, intense food production and economic interdependence. At the same time awareness to preserve the environment becomes a common problem for all stakeholders. However, in these countries the increase of obesity is linked to a high consumption of foods rich in sugar and fat. Indeed the trend of the consumption of the already prepared meals/foods and the number of restaurants is in continuous development^(36,37).

The situation as described in the present paper raises the problem of sustainability of the traditional diet that is required for health sustainability. Rethinking and seeking a dietary model that reconciles nutritional requirements and also environment preservation is needed in this challenging situation. The Mediterranean dietary model, presented as a healthy and sustainable diet, could be an example of a diet to be promoted because it is nutritionally healthy, it is rich in biodiversity, it respects environment and it has beneficial role in the development of sustainable agriculture in the Mediterranean region.

Conclusion

The ongoing NT in low- and middle-income countries is evidently associated with the double burden of

malnutrition. Accurate nutritional policy and education can reverse these effects of NT on health, by promoting a traditional sustainable dietary model.

Acknowledgements

The author wishes to thank the members of the Research Unit on Nutrition and Food Sciences for helping with the data collection.

Financial Support

The conference organisers financially supported participation in the conference on 'Sustainable Diet and Food Security'.

Conflicts of Interest

None.

References

1. Popkin BM, Adair LS & Wen Ng S (2012) Now and then: the global nutrition transition: the pandemic of obesity in developing countries. *Nutr Rev* **70**, 3–21.
2. Popkin BM (1994) The nutrition transition in low-income countries: an emerging crisis. *Nutr Rev* **52**, 285–298.
3. Schmidhuber J & Shetty P (2005) The nutrition transition to 2030. Why developing countries are likely to bear the major burden. *Food Econ – Acta Agric Scand* **2**, 156–166.
4. Food and Agriculture Organization (2009) *Declaration of the World Summit on Food Security*. Report: 16, Rome.
5. World Economic Forum (2013) *Global Agenda Council on Food & Nutrition Security 2012–2014*. Available at: <http://www.weforum.org/content/global-agenda-council-food-nutrition-security-2012-2014>.
6. Lang T (2009) How new is the world food crisis? Thoughts on the long dynamic of Food Democracy, Food Control & Food Policy in the 21st century. Presented to the Visible Warnings: The world food Crisis in Perspective Conference April 3–4, Cornell University, Ithaca, NY. Available at: http://foodsecurecanada.org/sites/default/files/Lang_T_Cornell_01_04_091.pdf.
7. De-Onis M & Blössner M (2000) Prevalence and trends of overweight among preschool children in developing countries. *Am J Clin Nutr* **72**, 1032–1039.
8. Popkin BM (2001) The nutrition transition and obesity in the developing world. *Am J Nutr* **131**, 871S–873S.
9. Gaziano TA (2007) Reducing the growing burden of cardiovascular disease in the developing world. *Health Aff* **26**, 13–24.
10. Osman M Galal (2002) The nutrition transition in Egypt: obesity and the food consumption context. *Public Health Nutr* **5**, 141–148.
11. Ragui A & Farzaneh RF (2008) Shaping the Future: a long-term perspective of people and job mobility for the Middle East and North Africa. World Bank. (<http://go.worldbank.org>)
12. White MJ (2013) Moving migration into Century 21. *Revue Quetelet/Quetelet Journal* **1**, 7–31.



13. United Nations Children's Fund (2013) Levels & Trends in Child Mortality: The Estimates developed by United Nations Inter-agency Group for Child Mortality Estimation. Available at: http://www.childinfo.org/files/Child_Mortality_Report_2013.pdf.
14. Karoui H. Global Trends in Gulf and Middle East Population Evolution. National Security & Foreign Relations Law eJournal 11/2006; <http://ssrn.com>
15. United Nations (2009) *World Population Prospects-The 2008 Revision*. New York: United Nations.
16. World Bank (2012) World Urbanization prospects. The 2012 revision, Highlights and Advance Tables. Department of Economic and social affairs/Population Division, United Nations. Available at: http://esa.un.org/unpd/wpp/Documentation/pdf/WPP2012_HIGHLIGHTS.pdf.
17. Haut Commissariat au Plan. Taux d'urbanisation (en %) par année (1960–2050) http://www.hcp.ma/Taux-d-urbanisation-en-par-annee-1960--2050_a682.html
18. Getz GS & Reardon CA (2007) Nutrition and cardiovascular disease. *Arterioscler Thromb Vasc Biol* **27**, 2499–2506.
19. Rguibi M & Belahsen R (2004) Metabolic syndrome among Moroccan Sahraoui adult women. *Am J Hum Biol* **16**, 598–601.
20. Food and Agriculture Organization (2005) The State of Food Insecurity in the World 2005: eradicating world hunger – key to achieving the Millennium Development Goals. Rome: FAO.
21. UN SCN (2004) 5th Report on the world nutrition situation. Nutrition for improved development outcomes. Geneva: United Nations.
22. United Nations Children's Fund (2013) Global nutrition database. *Improving child nutrition: the achievable imperative for global progress*. Available at: http://www.unicef.org/media/files/nutrition_report_2013.pdf.
23. Khor GL (2003) Update on the prevalence of malnutrition among children in Asia. *Nepal Med Coll J* **5**, 113–122.
24. Food and Agriculture Organization (2013) Joint FAO/WHO International Conference on Nutrition (ICN+21), Concept Note. Rome: FAO. Available at: http://www.unicef.org/nutritioncluster/files/ICN_Rome_Nov_13-15_2013_concept_note.pdf.
25. Azizi F & Mehran L (2004) Experiences in the prevention, control and elimination of iodine deficiency disorders: a regional perspective. *East Mediterr J* **10**, 761–770.
26. World Health Organization (1997) The World Health Report 1997 – Conquering Suffering Enriching Humanity. Geneva: World Health Organisation.
27. International Food Policy Research (2005) *The world food situation: An overview*. Available at: <http://www.ifpri.org/sites/default/files/publications/jvbagm2005.pdf>.
28. Belfki H, Ben Ali S, Aounallah-Skhiri H *et al.* (2013) Prevalence and determinants of the metabolic syndrome among Tunisian adults: results of the Epidemiological Transition and Health Impact in North Africa (TAHINA) project. *Public Health Nutr*. **16**, 582–590.
29. Bouguerra R, Ben Salem L, Alberti H *et al.* (2006) Prevalence of metabolic abnormalities in the Tunisian adults: a population based study. *Diab Metab* **32**, 215–222.
30. Belahsen R, Bermudez O, Mziwira M *et al.* (2005) Obesity and related metabolic disorders are prevalent in Moroccan women of child-bearing age. *Int J Diab Metab* **13**, 159–166.
31. World Health Organization Global InfoBase 2006: Online. http://www.who.int/ncd_surveillance/infobase/web/InfoBasePolicyMaker/Reports/reportListCountries.aspx.
32. Benjelloun S (2002) Nutrition transition in Morocco. *Public Health Nutr* **5**, 135–140.
33. Rayner G, Hawkes C, Lang T *et al.* (2006) Trade liberalization and the diet transition: a public health response. *Health Promot Int* **21**, 67–74.
34. El ayachi M, Mziwira M, Vincent S *et al.* (2005) Lipoprotein profile and prevalence of cardiovascular risk factors in urban Moroccan women. *Eur J Clin Nutr* **59**, 1379–1386.
35. Food and Agriculture Organization of the United Nations (2011) Food Balance Sheets. <http://www.faostat.fao.org/site/368/default.aspx> (accessed Nov–Dec 2010).
36. Haut Commissariat au Plan (1998/1999) Enquêtes nationales sur les niveaux de vie des ménages: ENNVM Report. Available at: www.hcp.ma.
37. Haut Commissariat au Plan (2006/2007) Enquêtes nationales sur les niveaux de vie des ménages: ENNVM Report. Available at: www.hcp.ma.