

Review Article

Weight management in transitional economies: the “double burden of disease” dilemma

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The nature of nutritionally-related disease (NRD) in transitional economies is such that deficiency can frequently co-exist with excess. This is most usually represented by the combination of diets of low nutritional quality (low and little food component density and diversity, FCDD) and decreased levels of physical activity, predicated, in part, on limited affordability of alternatives. Moreover, these changes are not simply inter-generational, as the pace of socio-environmental change is great enough for them to be intra-generational as well. The most troublesome situation is that of maternal undernutrition, with intra-uterine growth retardation, compromised lactation and infant feeding, leading to stunting in early life and to abdominal obesity and its consequences later in life. Weight management in these situations requires pre-conceptual interventions, effective maternal-child health programmes and life-long approaches to avoid inappropriate gene programming and body compositional disorders. It is unlikely that narrow strategies, located solely around energy balance, will do more than attenuate this growing burden of disease for most of the world's populations. The pluralistic approaches to health required are likely to build on more effective lifestyle, behavioural and pharmacotherapeutic strategies to weight management, and do so at all ages, from conception to later life.

Key Words: Nutritionally-Related Disease (NRD), deficiency disorders, body compositional disorders (BCD), energy imbalance, food component density and diversity (FCDD), poverty, affordability, maternal health, child health, life stages

Weight and Body Compositional Disorders (BCD) in transitional economies

The legacy of impoverished societies with marginal or inadequate food supplies is a population with a history of intra-uterine growth retardation. Evident are stunting and the sequelae of previous or ongoing micro-nutrient deficiencies, along with the poorly defined consequences of a wider array of other food component, usually phytochemical, deficiencies. This contributes to reduced life expectancies and a burden of disease which is typically dominated by recurrent infection.^{1-4,5}

In the past, economic development was often slow and, as in the West's industrial revolution, obtained at a high price to health well-being and life because of injury and toxicity, with major occupational health problems and because of social dislocation. Now the pace of change is faster and, to the previously recognized problems are added a major decline in physical activity and an unfamiliar and largely unproven (for health and sustainability) food supply⁶⁻⁹ (Fig. 1). The nutritional problems are combined and cumulative in transitional economies where preventive or corrective measures are of low policy priority, advocacy poorly developed and capacity for structural change in education and health systems limited (Fig. 2).

The consequences of this economic transition are that, in the one family, grandparents, parents and children have different nutritional attainments (more obvious with stature, but also in lean mass, both muscle and bone, and in fat mass and its distribution). Children also differ one from the other depending on the degree of privation or of increased food supply on the one hand, and changed energy expenditure on the other. It is possible, and common, for stunted children to develop abdominal obesity, or sarcopenic (reduced skeletal muscle) adults and older people to have excess fat mass.¹⁰⁻¹³

This has come to be known as the “*Double Burden of Disease*”.^{14,15} Because of the complexity of the body compositional disorders (BCD),^{16,17} “*dysnutrition*” has advantage as a descriptor at the tissue level; this has been used to describe, diagnose and manage these disorders in the aged.¹⁸ However, there is a spectrum of disorder and disease related to these BCD and their determinants,

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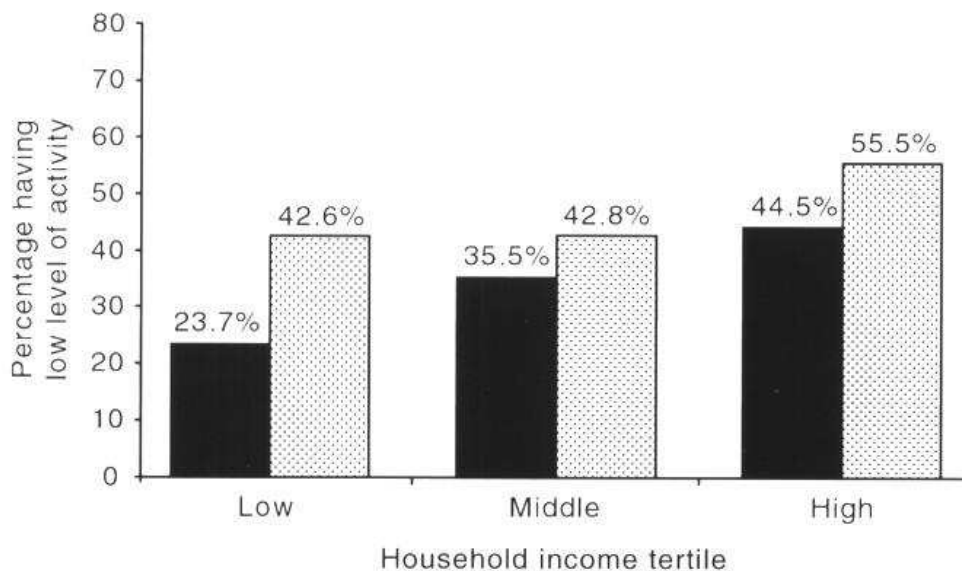


Figure 1. Percentage having low level of physical according to household income

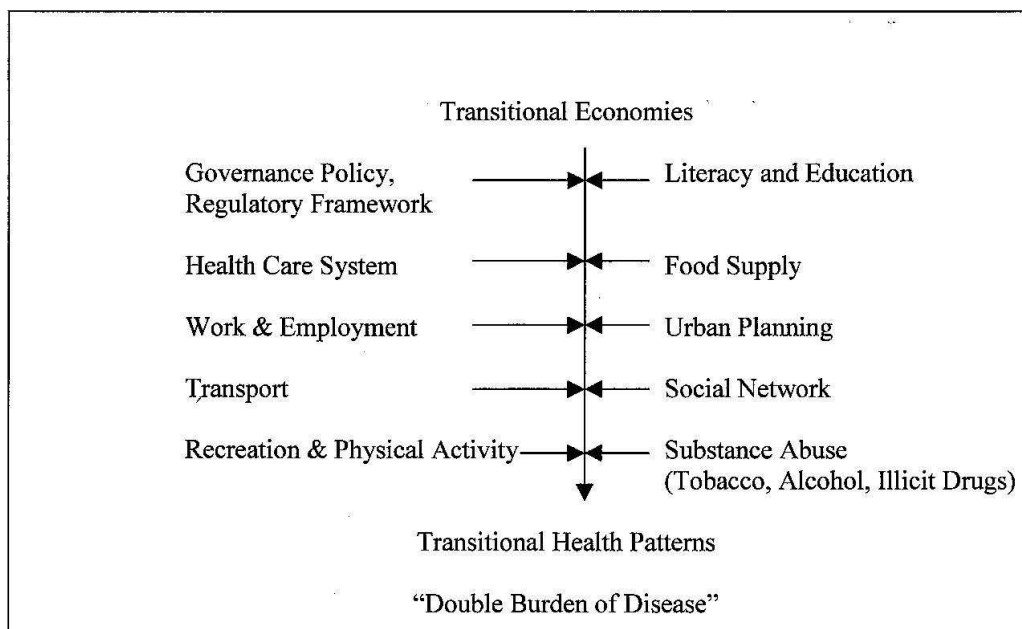


Figure 2. Transitional Economies and the Double Burden of Disease

ranging from susceptibility to infection, to inflammatory disorders (eg. macrovascular or atherosclerotic disease; cancer, diabetes complications)^{19,20} seen with excess fatness and “chronic disease” in general (eg. certain cancers, musculo-skeletal disease, bone health).²¹ For this reason, and the broad spectrum of health problems that may arise, the term “Nutritionally-Related Disorders” (NRD) may be useful (Fig. 3).

Whilst the centrality of body compositional disorder is apparent in the health patterns of transitional economies, it is no less so in severely disadvantaged or advantaged economies; only the emphasis changes. This can be reflected in the way anthropometric indices are considered, as with a BMI (Body Mass Index) and abdominal circumference matrix.¹²

Thus, the importance of acknowledging that disorders of body fatness are rarely simple and that their diagnosis and management may be undertaken only in part as “weight” is clear. Far better for there to be an integrated body compositional approach.^{16,17} This particularly applies to transitional economies as body fatness, especially abdominal fatness increases with its risks for chronic disease.²¹⁻²³

Socio-economic determinants of “Weight Disorders”

Not only has the “weight disorder” been oversimplified, but so may its causes and pathophysiology, which, in turn, may preclude the most strategic preventive or therapeutic approaches. One of the clearest examples of this is *fat distribution* which, when more abdominal (and omental in particular), carries the greater health risk

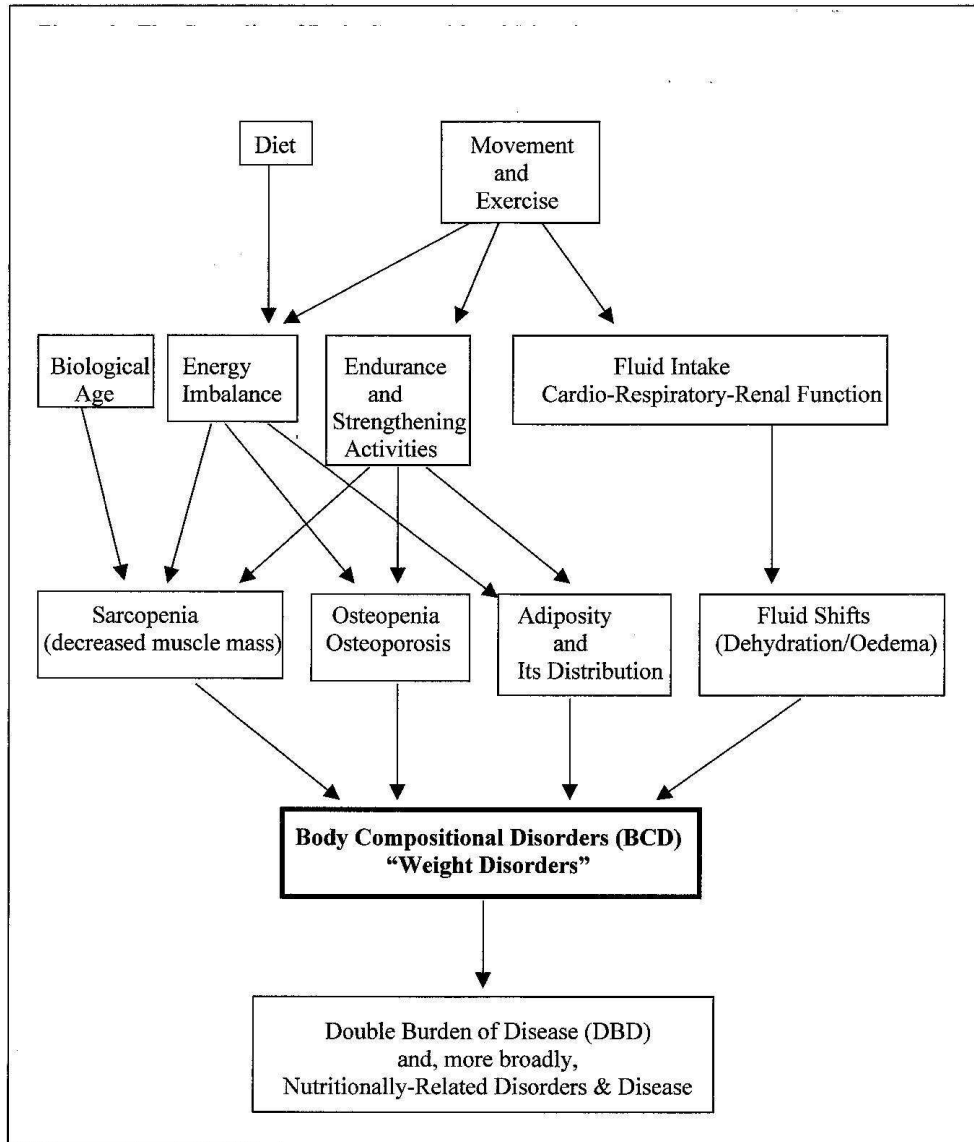


Figure 3. The centrality of body composition disorders

compared with total body fatness. We know that *gender, neuro-hormonal factors, exercise, and substance abuse* (alcohol and tobacco) play a role in fat distribution.¹³ Bjorntorp has described the cortical-hypothalamic-neuro-hormonal pathway to abdominal fatness, which provides for environmental and neuro-behavioural factors to affect fat distribution.^{24,25} In turn, these have their socio-economic determinants.

Economic development does not always allow health advancement, although resources are needed to optimise health.²⁶ Moreover, the limits to economic growth, with a rapid increase in the burden of obesity and its consequences, may be ultimately profound – especially with diabetes and its complications which could affect a majority of the population.

It is generally recognized that there is a strong social class stratification in risk of overweight and obesity, which in turn has much to do with educational and economic advantage.^{12,27-32} In the early stages of economic transition, the advantaged may more often be overweight, but later as long term health becomes a priority, the advantaged secure measures to minimize body compositional disorders.

Body image itself, often with marked cultural disparity, can also play a significant role, interactive with socio-economic factors in body composition. Pacific Islanders demonstrate this particularly well.³³ The same factors presumably operate in some of the geographical disparity in weight disorder prevalence.³⁴⁻³⁷ In rural and urban populations in Australia,³⁸ poorer farming and mining communities may be more obese than their city counterparts.³⁹

Environmental and food cultural considerations in weight disorders

Weight disorders are particularly *heterogenous*, not only because of the spectrum of body compositional change possible, but because of the different ways in which they may have occurred at different points in the life cycle, and whether or not they are currently stable or dynamic (still undergoing change in one direction or another). Environmental factors and various food cultural settings in which weight disorders occur adds further complexity to this; for prevention and management these matters need to be taken into account. Environments may act in several ways to affect body composition:

1) *Opportunities or deterrents to relaxation and recreation*

A walk on a clean and inviting beach or in pristine woods (with their smells, sights and sounds) may be enough to engender appropriate eating habits. And, of course, it will have allowed some latitude in food intake because of the greater energy (calorie) throughput on the walk and afterwards because of better maintained muscle mass (with its significant mass-related energy expenditure). It is also likely, because of the pleasure involved, that the distances traversed will be longer, and that incidental movement will provide for some resistance training, with its well-documented benefits for insulin sensitivity and related phenomenon.⁴⁰⁻⁴² Experiences and outcomes like these gather many factors together in an integrated fashion to benefit human performance, not only body composition.

2) *Safety and security*

Perceived or actual personal and public safety may be significant barriers to or inducers of physical activity, fitness and body compositional health. This is now most notable in the growing limits to unsupervised play by children in public precincts (parks streets, beaches) and in where women may safely go alone, whether to work or play.

3) *Degree and kind of adaptation to climate, season, work routine or household*

Securing time to walk when not interrupted or having to compete with other tasks or demanding people (eg. at the beginning of the day) can be critical for health. It may be too dark, or too hot, or too cold at one time of the day, or in a particular season, or because of the hours of work. Life skills and resources to manage the adaptive process is likely to be more important than preoccupation with food intake, or exercise prescription.

4) *A culture of health-seeking behaviour*

"How are you?" or "How did you sleep?" is a common and potentially more powerful social discourse than now realised. Sensible concern about one's own and other's health can mobilise strategies and resources to lift the profile of health and ameliorate weight disorders. So also can good sleep patterns, which may, in any case, be adversely affected by the extremes of energy balance (hunger and surfeit; wasting and obesity), as in restlessness on the one hand and obstructive sleep apnoea and day-time sleepiness on the other.

5) *The presence of gardens*

Gardens and gardening indicate pride and pleasure in a world beyond oneself, visual appreciation and beauty, and opportunities for food production (for oneself and others) and for complex aerobic and resistance exercise. All of this favours healthy body composition.

Food cultural considerations of relevance to weight disorders are several:

1) Stable food cultures generally provide for checks and balances in eating behaviour, appropriate for energy needs and, therefore, body composition, unless the food chain is interrupted or disrupted.

2) Developed food cultures usually form part of a broader culture of livelihood and play, social support, and economic opportunity. They reduce the risk of food shortage and maldistribution which may lead to body compositional disorders.

3) Food cultures have celebratory occasions and foods, so that food plays a cohesive and social role.⁴³ The difficulty arises when the food culture is one-continuous-celebration. Increasing economic advantage can encourage, for example, the use of energy-dense foods (as snacks) on a daily basis, as opposed to the occasional. Eventually, more nutritionally-sound "niche" snacks may be used on more affluent societies which can afford this level of health-seeking behaviour.

4) *When food culture is in-transition*, new risks and benefits arise, and it is a matter of insight, education, organization and time whether body compositional disorders will be exacerbated. The different experience of "Double Burden of Disease" throughout communities and between communities indicates this. In Asia, even with the similar oriental food cultures, principally Chinese, Japanese, Thai, Filipino, Malaysian and Indonesian, the appearance of obesity may be low (as in Japan with the prevalence of BMI ≥ 30 kg.m² still being low overall at about 3% but with a considerable gender and age differential)⁴⁴⁻⁴⁷ or high (as in Indians in Malaysia).⁴⁸⁻⁵² Chinese in Hong Kong⁵³⁻⁵⁵ have lower prevalence of obesity than Chinese in Singapore.^{56,57}

A life-long approach to Nutritionally Related Disorders and Diseases (NRD)

This can be thought about from pre-conception to later life:

(1) *Pre-conception*

A mother who is overweight or obese is more likely to have gestational diabetes and the off-spring, in turn, to have diabetes.⁵⁸ Therefore weight management ought to begin ahead of conception in the prospective mother. We know little at present about the effects of paternal nutritional status on the conceptus, child and its future, but indications are that what the father is exposed to or how he eats does alter health risk in his child.⁵⁹⁻⁶¹

(2) *Conception and intra-uterine development*

How nutritious (nutrient dense) the mother's food is (and the converse is often how energy dense it is) affects the micronutrient (vitamin, mineral, essential amino acid, essential fatty acid and phytochemical) exposures of the conceptus. This is best studied for folic acid, but, to some extent, must apply to all nutrients required for cell proliferation and organ development. It is also now recognized that this applies

to gene expression during fetal development and later in extra-uterine life and development.⁶²

(3) *Birth weight*

Birth weight is usually the second question asked a baby at birth, after its gender. It is an important prognosticator of neonatal and life-long health.^{63,64} So are other anthropometric variables at birth – head circumference and length for example. Although factors other than maternal nutrition affect these measurements, and each of them will have different pathogeneses, the implications for long-term, healthy body compositional strategies, beginning with maternal health and nutrition are clear.

(4) *Growth and development, puberty*

Episodes of food deprivation and excess, along with recurrent infection, and social deprivation contribute to stunting. In turn, this makes the passage through puberty more difficult for weight-height relationships, especially if the food supply is precarious, or excessive with limited physical activity. It becomes difficult to effect weight management at the threshold of adolescence with the competing needs during growth and pubertal development for energy balance, growth and nutrient adequacy.⁶⁵

(5) *Reproductive years*

These may begin in adolescence, when growth is still taking place, body image and identity being formed, and successful socialisation challenging and often fragile. Healthy eating and exercise may suffer. Then body compositional health may be a focus with forthcoming life partnerships and marriage, only to falter again with new household dynamics. Substance abuse with tobacco, alcohol and illicit drugs may further complicate this picture¹³ where loving and caring relationships and supportive food habits have characterized the child's upbringing, these risks are less likely. As discussed elsewhere, the nutritional health of parents-to-be needs a high priority, at a time when other priorities may supervene, and often be ones of sheer survival weight management here is at its most demanding.

(6) *Manifestation of chronic disease*

Whilst the role of overweight in chronic disease is apparent, its precursors may be as early as intra-uterine life and maternal nutrition – at least for diabetes, cardiovascular disease and certain cancers, but this is probably only the beginning of this field of enquiry with musculoskeletal, reproductive and mental health on the agenda.^{63,66,67} Further, the advent of chronic disease, like osteoarthritis, in turn affects weight management. As populations age, which becomes more evident once economic transition is underway, this interplay between body composition and health becomes more complex and problematic.

(7) *Later Life*

Those in later life are relative survivors. Whilst, especially abdominal fatness, and unfitness, are

factors in important age-related health problems (eg. diabetes, cardiovascular disease), there is evidence that the elderly (over 70 years) tolerate more body fat than their younger peers.⁶⁸ In later years, particularly, fitness may be more important than fatness.^{40,41,69,70} Regular physical activity staves off disability for several years.⁷¹

Governance, health care systems, the regulatory System and Codes of Practice

It is increasingly clear that favourable health outcomes at all stages of life depend on a number of crucial factors:

- (1) Maternal literacy^{26,72}
- (2) Good governance and accountability⁷³
- (3) The regulatory system; mandated and voluntary (especially for sanitation, food, immunization, child care, education, safety, contracts, competition, and much more). In the areas of body compositional disorders and weight management, consumer movements are playing a vital role in dealing with exploitative practices; in Australia this has led to a "Code of Practice for the Weight Management Industry" www.weightcouncil.org.⁷⁴ This could be of value in transitional and other advanced economies.
- (4) Economic development which takes account of health.³⁹ Health advancement and economic development may proceed together, but do not necessarily do so. The role of government is to establish a regulatory framework in which they can move together favourably. Education and empowered consumers, especially women, can be monitors and effective advocates for the process. It is women who have been most alert to body compositional disorders in themselves and their families, not only because of social norms about beauty, but also because of a keen sense that these disorders are indicative of health prospects-at-large. Men, too, are now catching on to this reality.
- (5) Affordability for the various preventive and management options (lifestyle, pharmacotherapeutic, surgical) will be critical in transitional economies where daily income is often well below the cost of commercial products^{75,76}

Conclusion

The increasing global health problem of obesity will numerically affect more people in transitional economies than in any other setting.⁷⁷ The origins of this problem are in adverse living conditions and rapidly changing food habits, themselves based on the nature of current economic growth. Sustainable economies and environments with affordable preventive health and health management strategies will require a new order of partnership, especially in critical areas like weight and body compositional disorders.

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Review Article

Weight management in transitional economies: the “double burden of disease” dilemma

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經濟轉型期的體重管理：“雙重負擔疾病”的困境

就營養相關疾病的本質而言，在經濟轉型期時經常會有缺乏與過剩兩者並存的現象。在有限的負擔能力及選擇下，這通常以合併低營養品質的膳食（較低或較少的營養密度及飲食多樣性）及減少體能活動量的方式表現出來。此外，這些改變並非是只在一個世代，而是當社會環境的改變的步調足夠大時，也會是跨世代的。其中最麻煩的狀況是營養不良的母親，導致尚在子宮內的胚胎生長遲緩，加上未盡理想的授乳與嬰兒哺餵，導致早期生長的遲滯，並造成長大後的腹部肥胖及其他連帶的不良後果。體重管理在這種狀況下需要懷孕前的介入，有效的嬰兒與母親健康計畫及終身的方法以避免不適當的基因程序或身體組成失調。這不是個僅僅將重心擺在熱量平衡的狹窄的策略，將會使得全世界大部分人口成長中的雙重負擔疾病不致更加惡化。為了健康，從懷孕到老年均要建立更有效的生活型態、行為以及藥物療法等多元策略。

關鍵詞：營養相關疾病、缺乏失調、身體組成失調、能量不平衡、營養密度與飲食多樣性、貧窮、可負擔力、母體健康、兒童健康、生命期。