Commentary

Are lifestyle shifts fuelling the obesity epidemic in urbanised Africans?

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Abstract: Humans evolved for active lifestyles involving hunting–gathering and agriculture. To sustain these energy-intensive lifestyles, diets consisting of energy-dense foods were selected. It can therefore be argued that humans are physiologically adapted for active lifestyles. However, with rapid industrialisation, there has been an upsurge in the usage of labour-saving devices as well as a glut in the supply of energy-dense foods. This mismatch between energy supply and expenditure in modern man may be fuelling the contemporary trends in obesity in urbanised man. On the other hand, recent emerging evidence indicates that air pollution related to motorised transportation in urban areas may be obesogenic by causing alterations in the lipid metabolic pathways, resulting in fat deposition. These lifestyle shifts are drastically different from traditional rural African lifestyles and mirror the different prevalence rates of obesity and related co-morbidities between rural versus urban areas. (Global Health Promotion, 2016; 23(4): 73–75)

Keywords: diet, physical activity, air pollution, energy imbalance, lifestyle disorders

Introduction

Numerous studies demonstrate a relationship between excessive body weight and chronic diseases, including cardiovascular disease, metabolic disorders, diabetes and some cancers (1). Obesity is a problem caused by prolonged energy imbalance where energy intake exceeds energy expenditure (2). Whether this has been a consequence of elevated food consumption or reduced physical activity remains a matter of intense debate (3). There is an increasing body of empirical findings that have demonstrated an association between increasing adiposity and adverse health outcomes, and therefore a reduction in body fat has been a primary aim of public health efforts to enhance population health. Recommendations on how to achieve a reduction in body fat have come from many sources, but the proposed strategy is usually to restrict caloric intake and/or increase caloric expenditure. The goal of these changes is to achieve negative energy balance – resulting in weight loss and health benefits associated with reduction in body fat.

Countries in Sub-Saharan Africa (SSA) are undergoing an epidemiological transition, reflected in the relative importance of lifestyle disorders such as obesity, metabolic syndrome and cancers as major causes of morbidity and mortality compared with infectious diseases. This epidemiological transition is more pronounced in urban compared with rural SSA. Furthermore, most countries in SSA are rapidly urbanising. Urbanisation is associated with affluence and adoption of Westernised lifestyles, reflected in extreme dietary shifts compared with traditional SSA diets. Urbanised Africans consume processed foods such as sausages, bacon, crisps, chocolate and soda. In contrast, typical rural diets in SSA are rich in fibre and unprocessed carbohydrate (usually from unsifted maize, millet, sorghum or cassava flour) as staples, which are usually consumed with leafy vegetables and occasionally with beef or fish. Consequently, most traditional diets in SSA are carbohydrate dense with lower proportions of proteins and lipids and high in dietary fibre compared with the standard Westernised diets

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consumed in urban SSA, which are rich in processed sugars (glucose/fructose) and low in dietary fibre.

These differences in diet quality are metabolically significant as they result in distinct postprandial spikes in blood nutrient levels, with implications for lipid profiles and adiposity in individuals. This is especially important in individuals migrating from rural to urban areas experiencing the dietary shift mentioned above. For instance, it would be expected that physiological adaptations in pancreatic and hepatic handling of dietary nutrients would make rural-dwelling individuals effective in handling the high blood sugar levels associated with the consumption of carbohydrate-dense foods, since consumption of these energy-intensive foods is crucial in helping individuals cope with the high energy demands associated with rural agrarian lifestyles. Therefore, consumption of foods rich in sugars does not result in shunting of excess sugars into the lipid metabolic pathway, as would be the case in sedentary individuals. Most of the consumed sugars, therefore, are used to support the high-activity budgets associated with rural lifestyles. On the other hand, when the same individuals migrate to urban centres, there is a decline in habitual physical activity. These individuals adopt sedentary lifestyles such as passive commuting using motorised transport, and mechanisation of activities of daily living as well as occupational labour, which are clearly associated with a drastic decline in habitual physical activity levels and concomitant decline in energy expenditure (4,5). It can therefore be argued that this mismatch between energy supply and expenditure could be the primary driver of the obesity epidemic in urban areas in Africa. These extreme lifestyle shifts in diet and physical activity have significant energy balance implications, and thus may account for the emerging epidemiological pattern of disease burden between rural versus urbanised areas of SSA – where urbanised Africans are at a greater risk of obesity and related co-morbidities compared with their rural counterparts. On the other hand, contemporary models of obesity as resulting from energy imbalance (energy intake versus energy expenditure) may be incomplete. Recent evidence indicates that other parameters involved in fat metabolism may be significant in the development of adverse adiposity in humans, and these factors need to be explored further. For instance, there is emerging evidence that traffic-related air pollutants may be linked to dysregulation of metabolic pathways, resulting in metabolic disorders and obesity (6). Therefore, models of energy imbalance may need to account for the impact of urban air pollution in fuelling increased adiposity in urbanised areas of SSA.

In summary:

- Urbanisation is associated with decline in habitual physical activity and extreme dietary shifts.
- Urbanised SSA reports higher prevalence rates of overweight/obesity and related co-morbidities (metabolic syndrome, diabetes and hypertension) compared with rural SSA.
- Differences in dietary intakes in rural versus urban SSA may explain the differential prevalence rates of metabolic disorders and obesity.
- The inflammatory effects of air pollution in urban areas may be significant in fuelling obesity in urbanised SSA.

Based on these arguments, it is hypothesised that:

1. The traditional diet in SSA is adaptive for high-activity budgets and metabolically maladaptive for sedentary lifestyles.
2. Decline in habitual physical activity and consumption of processed food rich in sugars and low in dietary fibres among urbanised Sub-Saharan Africans act synergistically to promote the development of adverse adiposity and metabolic syndrome.
3. Traffic-related air pollutants in urban areas may alter metabolic pathways, resulting in metabolic disorders and obesity.

Recommendations

Based on the three hypotheses above, it is recommended that future studies:

1. Should be designed to follow individuals longitudinally for (at least 3 years) to conclusively address the energy balance equation and its implications in the development of human obesity and related lifestyle disorders. Most of the previous studies on energy balance in SSA are cross-sectional, and therefore it is difficult to

determine the direction of causality between lifestyles and adverse metabolic events.

2. Use objective measures to determine habitual energy expenditure (e.g. doubly labelled water) in populations in SSA to conclusively determine whether declining energy expenditure accounts for observed trends in obesity.
3. Develop appropriate measures of energy intake – currently weighted dietary intake arguably provides the best approximation of energy intake. However, the use of postprandial nutrients may be explored as a viable alternative in the assessment of energy intake/metabolism and its implications in the development of adverse adiposity.
4. Investigate the role of air pollutants in the regulation of energy balance in humans.
5. Design intervention studies based on a clear understanding of the contributions of energy intake, expenditure and lipid metabolism in the determination of body composition and health in humans.

Conclusion

The energy balance conundrum in contemporary man remains a significant challenge for researchers as well as public health policy makers. An understanding of the dynamics of energy balance may help elucidate the roles of each component in determining body composition and health outcomes. This is based on the understanding that determinants of body fat are modifiable, and therefore evidence-based strategies can be deployed to combat the obesity epidemic in populations. Thus, future studies should develop appropriate evidence-based guidelines to inform public health recommendations on the roles of the environment, diet and physical activity in combating the obesity epidemic. These guidelines should address the emerging epidemiological challenge of increasing obesity, cardiovascular and other lifestyle disorders in populations.

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