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## Background

During the last years the prevalence of overweight/obesity increased despite numerous preventive measures. As forecasts predict a further increase (Butland et al. 2007), there is an urgent need for action (WHO 2007). For the development of sustainable preventive strategies it is crucial to give consideration to the particular challenges of the problem. This means that the multifactorial etiology as well as the complex interaction of causing and resulting factors have to be taken into account.

The aim of the present work is to increase the understanding of overweight/obesity. Knowledge from different perspectives and disciplines is integrated by visualizing the complex and multidimensional cause-effect structure of overweight/obesity.

## Methods

To visualize the complexity of overweight/obesity a qualitative cause-effect model of causing and resulting factors was developed by applying the nutrition ecological approach. The model is based on the results of current scientific literature (approx. 460 references). According to the nutrition ecological approach, causing and resulting factors of the four dimensions of nutrition (health, environment, economy, and society) were identified and depicted in their interrelatedness.

An electronic version of the model is available online ([www.uni-giessen.de/fbr09/nutr-ecol/forsc\\_obes\\_e.php](http://www.uni-giessen.de/fbr09/nutr-ecol/forsc_obes_e.php)). The model's hypertext structure contains detailed descriptions of selected factors and explanations of each relationship, including examples of references.

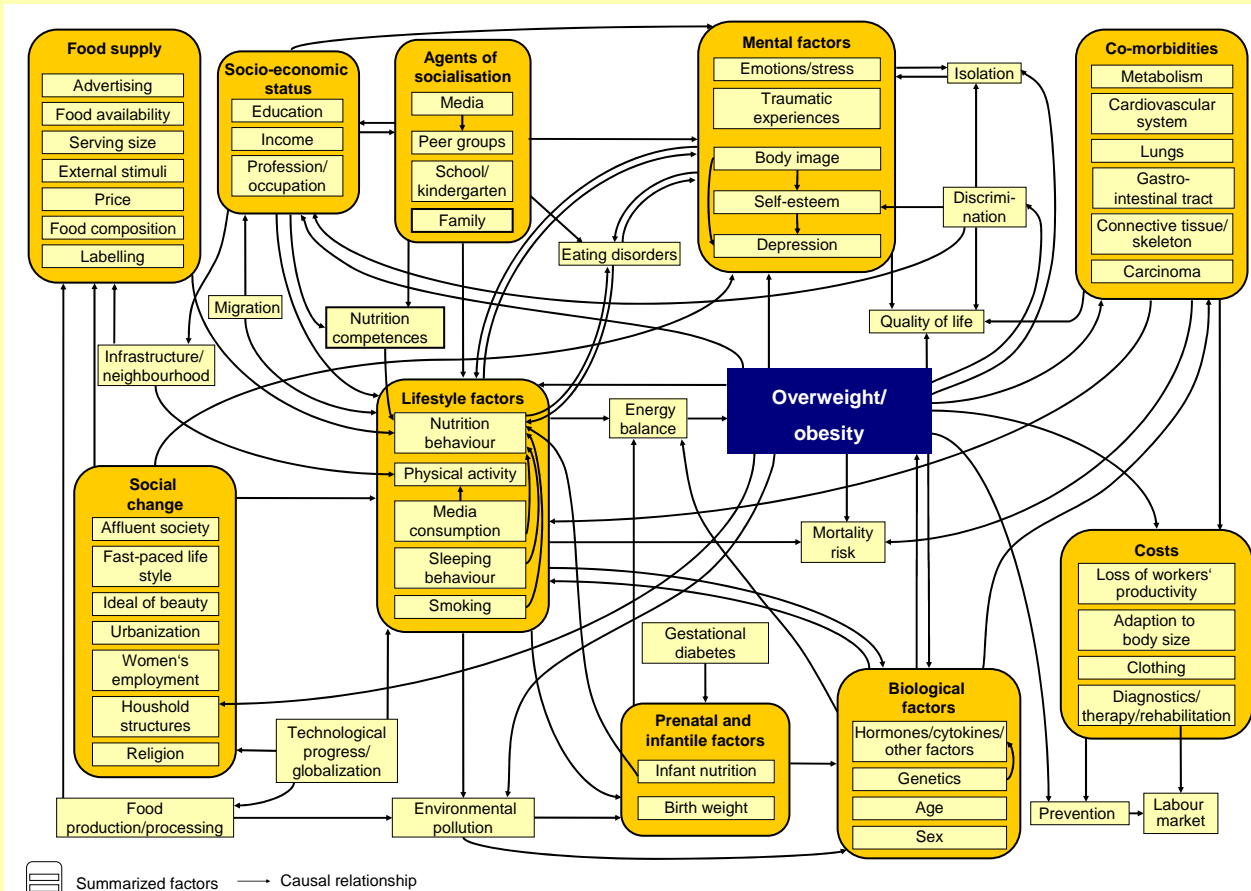


Figure 1: Causing and resulting factors of overweight/obesity in their interrelatedness (Schneider et al. 2009)

## Results

The model (figure 1) points out that overweight/obesity is caused by and results in a large number of factors. These are interrelated by numerous cause-effect relationships, both within and across the dimensions. By visualizing the complex and multidimensional structure, cause-effect chains and feedback loops become apparent. Due to this interrelatedness resulting factors can become causing factors and vice versa.

There are only two factors discernible directly causing overweight/obesity: energy balance, resulting from the ratio of energy intake to energy expenditure, and biological factors such as genetics. All other factors described in current literature affect overweight/obesity indirectly via cause-effect chains which result in lifestyle factors and in consequence in energy balance. Lifestyle factors themselves are caused by numerous other factors and cause-effect chains.

## Conclusions

For sustainable preventive strategies it is necessary to consider that there is a multitude of causing factors and that these – together with the resulting factors – are interrelated. Most preventive strategies focus on changing the energy balance by modifying nutrition behaviour and physical activity. However, further factors along cause-effect chains and feedback loops affecting nutrition behaviour and physical activity and therefore indirectly causing overweight/obesity need to be considered.

With the help of the cause-effect model a better understanding of the complex interactions concerning overweight/obesity can be obtained. The model may act as a base for planning sustainable strategies, since it allows taking into account direct and indirect factors from the four dimensions of nutrition in their interrelatedness. This way, promising starting points for prevention can be identified.

## Literature:

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WHO Regional Office for Europe (World Health Organisation) (ed): The challenge of obesity in the WHO European Region and the strategies for response. Copenhagen, 2007. Internet: <http://www.euro.who.int/document/E90711.pdf> (02.04.2009)