22.4 Incidence of obesity

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Incidence of obesity among adults and children	Health and Wellbeing
Description and justification	With an abundance of convenient, palatable, energy dense foods and increasingly fewer demands for physical activity in usual lifestyles, the contemporary environment enables the energy balance to be tipped in favour of weight gain (obesogenic environment) (Bhrem & D'Alession, 2014). In adults, obesity is associated with increasing risk of cardiovascular disease, type 2 diabetes, and all-cause mortality. Most of the associated mortality and morbidity is mediated through major chronic diseases related to obesity, such as cardiovascular disease, diabetes, and cancer (Bhrem & D'Alession, 2014). Overweight children face a greater risk of a host of problems, including type 2 diabetes, high blood pressure, high blood lipids, asthma, sleep apnea, chronic hypoxemia (too little oxygen in the blood), early maturation, and orthopaedic problems (Samuels, 2004). They also suffer psychosocial problems, including low self-esteem, poor body image, and symptoms of depression (Samuels, 2004). Studies conducted so far have focused on the relationship between access to green space and obesity or obesity-related health conditions, as well as to what extent this relationship is influenced by levels of physical activity, socio-economic status and age. A systematic review of evidence found that the majority of research undertaken have found a positive association between green space and obesity-related health indicators, but that the relationship varied across age, socioeconomic status and the type of greenspace measure, and findings are inconsistent and mixed across studies (Lachowicz & Jones, 2011). Beyond objective opportunities to access green space for physical activity and the availability and affordability of healthy food, actual use of green spaces might be a much better predictor of obesity outcomes (Lachowicz & Jones, 2011). Yoon and Kwon (2014) performed multilevel analysis to investigate community environmental effects on obesity and obesity risks. Relying on data collected with Community Health Surveys over a period of 2 years, the authors reported that objectively measured physical environmental variables did not significantly influence

	obesity, but *subjective perception of the community environment* (e.g., perceived accessibility to exercise facilities, satisfaction with safety, satisfaction with natural environment, satisfaction with living environment, satisfaction with public transportation) significantly influenced obesity. While obesity rates were higher among residents living in communities with high satisfaction with the natural environment, rates were lower among those living in communities reporting high satisfaction with use of public transportation. This means that providing access to green spaces might not be sufficient in reducing obesity, if green spaces and facilities for active mobility, exercise and leisure are not perceived as high quality and satisfactory. Calls for future research in studies focus on understanding intermediary mechanisms (e.g., psychosocial factors), as well as the amount and quality of green space necessary for significant reductions in obesity across all age groups (Lachowicz & Jones, 2011; Lachowicz & Jones, 2014).
Definition	ADULTS Obesity is defined as a measure of Body Mass Index (BMI) - a ratio of weight to height that is calculated by the following formula: BMI = weight (kg) ÷ height (m)² For adults, BMIs in the range of 18.5 to 24.9 are considered to be healthy – and associated with the lowest risk of mortality and morbidity. Overweight is defined as a BMI of 25.0 to 29.9; obesity is defined as a BMI of at least 30, with 3 sub-categories (Class I, Class II, and Class III) that are associated with increasing risk of cardiovascular disease, type 2 diabetes, and all-cause mortality (Bhrem and D'Alession, 2014). CHILDREN There is no consensus on a cut-off point for excess fatness of overweight or obesity in children and adolescents. European researchers classified overweight as at or above 85 percentile and obesity as at or above 95 percentile of BMI (Sahoo, Sahoo, Choudhury, Sofi, Kumar,& Bhadoria, 2015). **Incidence** represents how quickly new cases occur relative to population size and the passage of time. Incidence is calculated as the ratio of the number of new cases of a disease occurring within a population during a given time to the total number of people in the population (National Institutes of Health. Autoimmune diseases coordinating committee—Autoimmune diseases research plan, n.d.). While the prevalence represents the existing cases of a disease, the incidence reflects the number of new cases of disease within a certain period and can be expressed as a

	risk or an incidence rate ([Noordzij, Dekker, Zoccali, & Jager, 2010](#)).
Strengths and weaknesses	+ some evidence as to an association between exposure to nature (e.g., physical exercise, healthy food intake) and obesity-related health indicators - inconsistent and mixed results across studies, pointing at other variables that may be more relevant as predictors for obesity-related health indicators (e.g., actual use of green spaces, [Lachowicz & Jones, 2011](#))

Measurement procedure and tool	☒ *Quantitative*: epidemiological data (Health Data Administration/Cities)
	Recommended measurements for obesity:
	    o Measurements of BMI - adults*
	    o Waist circumference - children
	    o Measurement of subjective perception of the community environment (e.g., perceived accessibility to exercise facilities. satisfaction with safety, satisfaction with natural environment, satisfaction with living environment, satisfaction with public transportation) was proven to be of significance and it is recommended that is taken into account (see He [Yoon and Kwon, 2014](#)).
	
	Body mass index (BMI) is the most commonly used simple measure of adiposity, but it has limitations: it measures presumed excess weight given height, rather than actual body fat, and does not give any indication as to the distribution of fat in the body, and in adults, central adiposity is more closely associated with health risks than general adiposity. A wide range of alternative simple tools to measure adiposity or obesity is available, such as waist circumference, neck circumference, skinfold thickness, waist-to-hip ratio, waist-to-height ratio, body adiposity index, Rohrer's ponderal index, Benn's index and fat mass index ([Simmonds, Burch, Llewellyn, Griffiths, Yang, Owen, Duffy, & Woolacott, 201](#)5; [Simmonds, Llewellyn, Owen, & Woolacott, 2015](#)).
	
	While BMI seems appropriate for differentiating adults, it may not be as useful in children because of their changing body shape as they progress through normal growth. In addition, BMI fails to distinguish between fat and fat-free mass (muscle and bone) and may exaggerate obesity in large muscular children. Furthermore, maturation pattern differs between genders and different ethnic groups. While health consequences of obesity are related to excess fatness, the ideal method of classification should be based on direct measurement of fatness. Although methods such as densitometry can be used in research practice, they are

	not feasible for clinical settings. For large population-based studies and clinical situations, bioelectrical impedance analysis (BIA) is widely used. Waist circumference seems to be more accurate for children because it targets central obesity, which is a risk factor for type II diabetes and coronary heart disease (Sahoo et al., 2015).
Scale of measurement	-
Data source	
Required data	✓ Essential: NBS characteristics for each city/site
Data input type	Quantitative
Data collection frequency	Before and after NBS implementation (longitudinal)
Level of expertise required	☒ Methodology and data analysis requires high expertise in psycho-social research ☒ Quantitative data collection requires no expertise
Synergies with other indicators	P3 Perceived Quality of Green Spaces Sc5.1 Perceived Safety Sc5.2 Actual Safety SC7 Geographical Access to NBS SC8 Perceived Access to NBS HW1 Sustainable nutrition/adoption HW3 General Wellbeing and Happiness HW4 Life expectancy and healthy life years expectancy HW6 Prevalence, incidence, morbidity, and mortality of cardiovascular disease (CVD) HW10 Prevalence, incidence, morbidity of chronic stress HW11 Mental Health Wellbeing: Depression and Anxiety HW12 Restoration-Recreation: Enhanced physical activity and meaningful leisure
Connection with SDGs	Goal 3. Ensure healthy lives and promote well-being for all at all ages Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
Opportunities for participatory data collection	-
Additional information	
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