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CURRENT OPINION

Health Economic Evaluations of Obesity Interventions: Expert Views on How We Can Identify, Interpret, Analyse and Translate Effects

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Abstract

Economic evaluations of obesity interventions are critical to informing policymakers and clinical practitioners about best-value prevention and treatment interventions. However, existing studies often fail to measure appropriate outcomes over sufficient time periods and to adequately address the complexity of data, environments and outcomes. An international, multidisciplinary workshop in Ireland (May 2023) addressed these issues through scientific presentations on obesity modelling, group discussions and interactive small-group exercises. Nineteen presenters and participants co-created a list of research needs, priorities and strategies for the long-term study of obesity and its complications. To support availability of relevant outcome and cost data for health economic analyses, participants highlighted a need to define standards for data collection, data sharing, modelling, and integrating a systems perspective. For example, regarding data collection, careful consideration must be given to selecting valid and relevant health-related outcomes for determining future health risk. Although these issues have been previously highlighted, they remain critical barriers to comprehensive economic obesity studies. To identify best-value obesity interventions, researchers should prioritise strategies to overcome these barriers. This includes early engagement with multidisciplinary stakeholders to integrate diverse perspectives. Developing infrastructure to support international collaborations between researchers, policymakers and patient representatives was also recommended. Additionally, establishing best-practice guidelines could help researchers navigate the complexities of obesity data, environments and outcomes, particularly in data-scarce research environments. The creation of a core outcomes set for obesity would standardise measures for economic evaluations, thereby facilitating more robust cross-country comparisons of intervention effects and improving the evidence base and overall quality of future obesity research.

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Key Points for Decision Makers

Key challenges exist in economic evaluations of obesity interventions, e.g., limited availability of long-term data and over-reliance on body mass index as the primary outcome measure. To address complexity and measure effectiveness in research, we recommend to:

Adopt a systems-thinking approach to account for the complexity of obesity.

Standardise data collection methods to improve reliability and comparability across settings.

Foster international collaboration to enhance data sharing and collective learning.

Involve diverse stakeholders, including clinicians, policymakers and community representatives.

Use broader health and social outcomes to capture the multifaceted impact of obesity interventions.

1 Background

Obesity is defined as one of three major health threats contributing to the Global Syndemic; where obesity, undernutrition and climate change affect most people worldwide, with complex interactions and mutual societal causes [1, 2].

Obesity is a chronic relapsing disease associated with negative physical and psycho-social health outcomes, such as reduced quality of life, school and occupational performance and social participation, as well as premature mortality [1, 3]. Structural causes of obesity and its consequences on a societal level are jointly described as obesogenic environments. These include infrastructural factors (e.g., school catering programmes), financial incentives for health-related behaviours (e.g., food and drink taxation schemes), financial or geographic access (e.g., barriers to participation in exercise programmes), or societal and political perceptions (e.g., stigmatisation which creates barriers to seeking treatment). Individual factors, such as socio-economic status, physiological predispositions and early-life factors further contribute to the complexity of obesity and its consequences.

The identification of risk factors and consequences of obesity [1, 3] has led to the development and implementation of obesity interventions across various settings and population groups, such as national sugar taxes or school-based health promotion programmes in many countries. However, the continuous political commitment and consensus needed to implement systematic comprehensive prevention policies has challenged an adequate response [4]. Accordingly, we continue living in obesogenic environments with rising obesity prevalence globally [5, 6]. This indicates that current interventions and policies are insufficient and that more efforts will be required to prevent and manage obesity. The miss-match of problem identification, implementation of interventions and impact on outcomes raises concerns about the adequacy of interventions, measured data or outcomes, the optimal time frame for monitoring and how to effectively handle the complexity of data, environments and outcomes.

These considerations are crucial for the conduct of health economic evaluations of obesity interventions [7]. Economic evaluations are commonly used to inform policymaking and clinical practice about best-value obesity interventions. To identify intervention effects at the population level, health economic assessments often use simulation models. Additionally, simulation modelling of obesity interventions can help clinical practitioners to identify individuals at high risk of obesity and related comorbidities, and to tailor treatment for particular patients. Similarly, simulation modelling can aid policymaker decisions in highlighting the most appropriate budget allocations for implementing population-level obesity prevention policies [8–10]. However, this is challenged by the complexities related to disentangling obesity as a chronic disease and as a risk factor for other chronic diseases, the limited availability of long-term data, inconsistent data reporting and the lack of guidelines for health economic assessment of obesity interventions [11, 12]. To support the conduct of economic obesity studies, a group of obesity and health economic experts in Europe collaborated to co-develop a list of key research needs, priorities and strategies for the long-term study of obesity interventions and their effects. Our goal was to identify issues and potential solutions in health economic evaluations of obesity interventions, such as interpretation, analysis and translation of intervention effects. The research needs, priorities and strategies will inform researchers and decision-makers of potential requirements for developing a more robust and reliable evidence base of obesity interventions.

2 Methods

Nineteen international stakeholders from multidisciplinary backgrounds approached this goal at an in-person workshop in Ireland, on 15–16 May 2023. The workshop entitled '*How do we measure success of obesity interventions? Identification, interpretation, evaluation and evidence translation of effects'* aimed to identify and address challenges in economic evaluations of obesity prevention and treatment interventions [13].

Workshop participants were identified from SciVal, the European Association on the Study of Obesity website; the UK National Institute for Health and Care Excellence (NICE) Guideline Group; the list of principal investigators of the World Health Organization-established Childhood Obesity Surveillance Initiative; and the European-based network COllaBoration in health economic modelling of overWEight and oBesity (COBWEB) email list. Participants were recruited via purposeful sampling to represent different health economic and obesity perspectives, including diverse clinical and research expertise, and lived experiences with obesity. The workshop date was set to precede the European Congress on Obesity, which took place in Dublin on 17–21st May 2023, to increase international participation. Approximately 130 email invitations were sent at the beginning of March 2023 and 24 people registered as workshop speakers or participants, 19 of whom attended the workshop. Attending speakers and participants represented a diverse stakeholder group, with expertise in health economics, public health research and policy, epidemiology, patient advocacy, health promotion, and adult and child obesity clinicians. This included one patient representative from a patient organisation. The group was gender-balanced (58% women), with different levels of seniority (e.g., PhD students, policy advisors, senior researchers, professors), wide age distribution, and representation from Ireland, Italy, Poland, Norway, Sweden, Germany and the UK.

A series of workshop presentations and interactive group activities were set out to identify research needs and challenges, innovative ideas to approach these challenges, and the potential of international and multidisciplinary networking to advance the field (Table 1). Activities included scientific presentations on country-specific health economic evaluations of public health interventions and on novel approaches and methods addressing specific nuances of the modelling process. Presentations elaborated on experiences from the EuroPurse project [14]; OECD Hip and Knee Surgery project [15]; collaborative work between Norway and Sweden (unpublished); NICE UK's PRIMEtime calorie model and health inequality impact tool [16–18]; and transportability methods to address external validity [19] (Table 1).

These were augmented with group discussions and interactive small-group exercises to co-create a list of research needs, priorities and innovative strategies for the long-term study of obesity and its consequences. Group exercises comprised open discussions specific to the preceding presentation topics, podium discussions between presenters and participants, and interactive small-group exercises guided by a set of predetermined questions between presentations (Table 1). For all small-group exercises, three to four attendants were randomly allocated to a group (ensuring a sufficient mix of interdisciplinary expertise), and pens and A0-sized paper were provided. Groups were encouraged to brainstorm using guiding questions, and to collate their main ideas on paper. Each group was asked to briefly present their ideas to the other participants, to drive further discussion among all participants.

Presentation slides and a feedback form were sent to participants after the workshop.

During the workshop, summary notes were recorded of the discussion points brought up during small-group exercises and other discussions, and from the interactive group exercises, written brainstorming notes were collected after the group sessions. These were compiled and used to identify the key points that were highlighted as important by participants. Narrative analysis techniques were used to identify recurring themes, sub-themes and examples. The identified themes were reviewed by all authors for approval, and edited to comprehensively reflect the defined research needs, priorities and strategies identified by all participants. The paper's authors include workshop organisers and an independent attendee with extensive experience in health economic obesity research.

3 Results

Various research needs and priorities were identified during the workshop, as well as actionable strategies to address these, as summarised in Table 2 and Fig. 1.

3.1 Research Needs and Priorities

Participants highlighted the importance of defining and measuring relevant short- and long-term outcomes and anticipated benefits to enable the robust estimation of costs and economic outcomes. Examples were educational outcomes of children, mental health outcomes or the potential role of policy regulations, such as taxation on unhealthy foods. The involvement of multiple sectors and environments in obesity research was mentioned as a challenge to uniform measurements that would support comprehensive health economic estimations. Another identified barrier was the perception of obesity as a lifestyle problem with sole individual responsibility, which often leads to stigmatisation and hesitancy to seek treatment and thereby may underestimate the medical need. To support improvements in measuring the needed data, participants agreed that a paradigm shift is required during study planning, stressing the importance of systems-thinking and top-down leadership when developing obesity interventions. Participants further suggested that natural experiment designs may offer additional opportunities for multi-component interventions as an important complement to clinical studies and non-complex intervention studies, which currently dominate the field. Additionally, it

Table 1 Summary of workshop 'How do we measure success of obesity interventions? Identification, interpretation, evaluation and evidence translation of effects'

Session topic	Presentation title	Interactive components
Perspectives in obesity interventions	Methodological needs for simulation and evaluation of complex obesity interventions: clinical perspective	
	Similarities and discrepancies between clinical and health economic evaluation: challenges and opportunities from the health economic perspective	
		Open group discussion
Who is benefitting and for how long?	Short reflections from a systematic review	
	Using simulation models to estimate sustainable long-term effects of weight management interventions	
	Real-world data as a novel approach to study treatment effects	
		Questions to guide group exercises: 1. What *research needs, priorities and challenges* do you see that require addressing? 1.1 What specific data, methodology or translation challenges have you encountered in the country contexts that you have been working in? 1.2 Who should be involved in decisions about identifying the key areas for research? Who are the key stakeholders? 1.3 How can we move towards reaching consensus among involved stakeholders and what processes should be followed? 2. Which *key skills, training and knowledge* are required?
International collaboration in obesity research: opportunities and data challenges	Collaboration in the Obesity Cobweb	
	International opportunities for obesity research: reflections on collaborative work and data challenges across jurisdictions	
		Podium discussion: identifying pitfalls for different countries
How do we measure success of obesity interventions?	Health inequalities in NICE's weight management guideline update: trialling NICE's Prototype Health Equity Impact Calculator	
	Discrepancies in measuring obesity during early childhood in Ireland	
		Open discussion

Table 1 (continued)

Session topic	Presentation title	Interactive components
International collaboration in obesity research: the way forward	Transportability as a method to enhance collaboration	
	Obesity modelling for decision making	
		Questions to guide group exercise on the potential of international networking to advance the field: 1. How can we *approach the various identified challenges* (data/methods/implementation/translation/evaluation)? 1.1 Are there any good-practice examples you may be aware of (e.g., in your/other countries)? 1.2 Have you found ways to make data more coherent across jurisdictions? 2. How could *international collaboration help you overcome* various challenges? 3. How can we mutually address the following *specific challenges*? 3.1 How can we support easy, transparent, and low-cost data collection & data sharing when following up with intervention results while maintaining rigour and data security? 3.2 How can we identify relevant data sources, how can we link data, and how can we overcome missing information? 3.3 How can we improve understanding/interpretation & use among various stakeholders (e.g., in policy)? 3.4 How can we better integrate the voices of people (including children) at risk of, or living with obesity?
Future collaboration, research activities and funding application	Opportunities for joint funding applications and collaboration within the Cobweb network	
		Open discussion

Italic font in column 'Interactive components' is displayed as in the original instructions provided to participants

Cobweb COllaBoration in health economic modelling of overWEight and oBesity, *NICE* UK National Institute for Health and Care Excellence

was emphasised that implementation processes should be evaluated to a larger extent.

Moreover, participants recognised the imperfection of body mass index (BMI), which economic evaluations often use as the sole obesity and health status measure. To address this, participants emphasised the need to involve people living with obesity and vulnerable groups in defining research questions and meaningful outcome measures, such as health-related quality of life (QoL) and patient-reported outcome measures.

Further challenges of current economic obesity models and obesity interventions included the lack of long-term follow-up data needed for life course modelling (e.g., weight regain trajectories, health improvements); difficulties in accessing data; limited considerations of health inequalities and how socioeconomic position may potentially influence the outcome of obesity interventions; and difficulties in measuring and integrating education- and labour market productivity-related outcomes (including beyond working-age adults). In general, the comparability of studies across different settings was mentioned as a challenge, due to differences in measurement and reporting of data, and differences in interventions between countries.

The participants identified specific research priorities to address some of these challenges, namely to:

- Broaden the focus on prevention, targeting communities (including preschool and school and involving families, teachers and communities) and physical environments (including food environments);
- Merge existing observational, registry and trial data; facilitate the sharing of high-quality (e.g., registry) data outside the countries of origin;
- Follow children's growth trajectories into adulthood;
- Include the voices of individuals across life stages (e.g., childhood, pregnancy, menopause, old age) and population groups (e.g., people with disabilities, different socioeconomic and vulnerable groups) when designing and conducting studies;
- Include distributional concerns (e.g., equity of intervention referral, access, uptake and completion across socioeconomic groups);

Table 2 Identified research needs, research priorities and strategies to support health economic evaluations of obesity interventions

Research needs and priorities		Strategies
Identified challenges	Identified solutions	Suggested next steps
Defining, measuring and reporting short- and long-term outcomes of interventions when multiple sectors and environments are involved; comparability of studies across different settings and interventions	• Paradigm shift during study planning • Systems thinking and top-down leadership in intervention design and evaluation • Natural experiment designs • Evaluation of implementation processes • Health economic training	Tools to guide future data collection: • Establish a common international health economic obesity model • Core outcomes set • Obesity-specific quality-of-life tool (for children) • Patient-reported outcome measures (for children) • Early HTA framework • Collaboration with expert groups
Perception of obesity as individual responsibility; stigmatisation	• Broaden focus on prevention • Target communities • Target physical environments	• Include various stakeholders in conversations, e.g., people living with obesity, children's advocacy groups, climate advocacy, policymakers • Creation of a comprehensive policy document • Focus on wider determinants of health
Imperfection of BMI as sole outcome measure; lack of outcomes related to education and labour-market productivity	• Involve people living with obesity and vulnerable groups to define outcome measures, e.g., related to quality of life	• Integrate additional layers of data, e.g., from qualitative research, public and patient/stakeholder involvement • Create an international data inventory
Lack of comprehensive long-term follow-up data	• Merge existing data • Use registry data where research data are unavailable • Follow children's growth trajectories into adulthood	• Involve transnational policymakers to establish monitoring targets and reporting on obesity-related goals • Implementation science approach • Consolidated Framework for Implementation Research Development
Difficulties accessing data	• Facilitate sharing of data across countries	• Use of mathematical BMI-based models or disease-based models (e.g., NICE UK Primetime model) • Sharing of data (including registry data) & methodologies across countries using digital solutions, e.g., synthetic data • Using transportability methods to estimate external validity of interventions effects
Limited consideration of health inequalities and distributional concerns	• Include different population groups and life stages • Consider equity of intervention referral, access, uptake and completion across groups	• NICE UK health inequality impact tool

BMI body mass index, *HTA* Health Technology Assessment, *NICE* UK National Institute for Health and Care Excellence

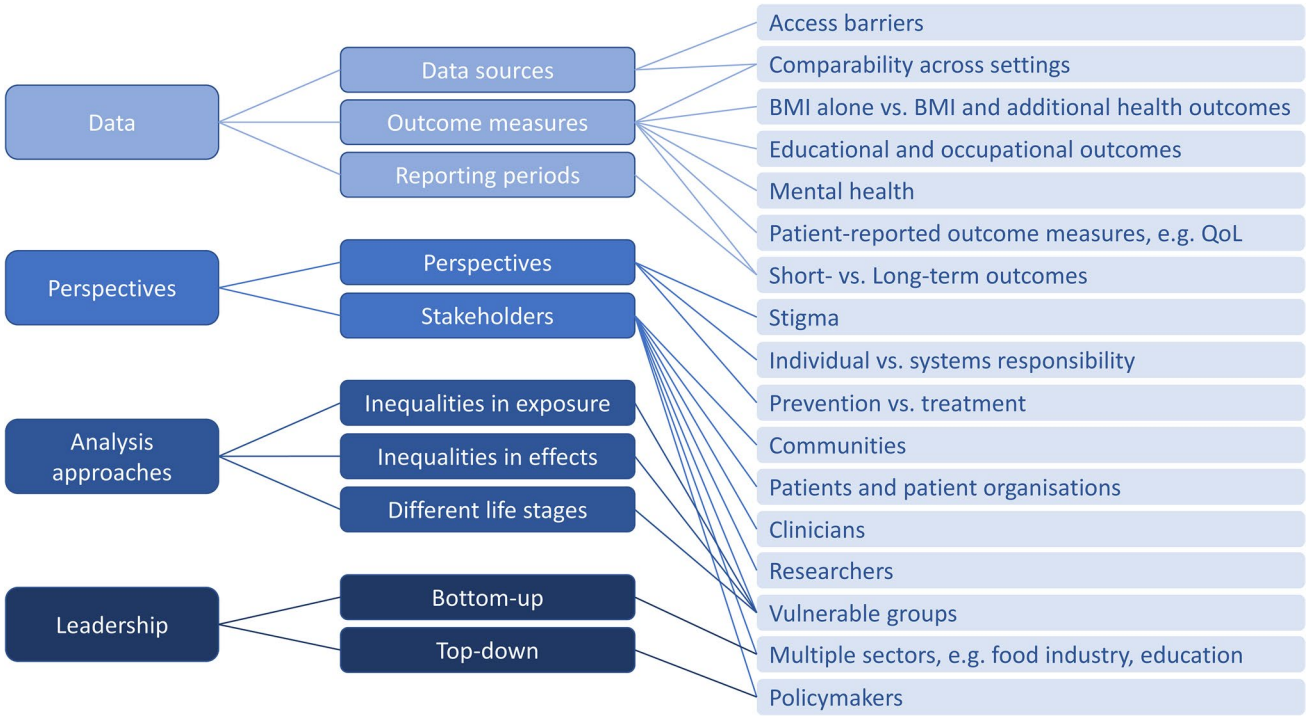

Fig. 1 Building blocks of systems-thinking and collaboration in health economic obesity research. *BMI* body mass index, *QoL* quality of life

- Improve obesity-specific QoL measurements;
- Evaluate natural experiments; and
- Provide health economic training to qualified and trainee health professionals and policymakers.

3.2 Tools to Overcome Data Gaps

Participants suggested that a common international health economic obesity model would be beneficial to inform decision making, and that standardised approaches to data collection processes and tools for future data collection should be agreed. One example of a practical tool included a core outcomes set, which would align to the WHO's International Classification of Functioning, Disability and Health framework [20]. Additionally, the development of a disease-specific QoL and patient-reported outcome measures tool for children was recommended. For example, it was suggested that an Early Health Technology Assessment framework may be appropriate to explore and define value during intervention development and move beyond the traditional retrospective economic evaluation using cost-effectiveness analysis, with high scope for further learning from other fields [21–23].

As a way of overcoming the challenges of gaining access to long-term data, the use of mathematical BMI-based models (i.e., changes in BMI are directly transferred into costs and effects) or disease-based models (i.e., changes in calorie/kg/BMI are used to simulate the prevalence of obesity-related diseases), such as NICE UK's Primetime model [17], were perceived as useful. Additionally, NICE developed a health inequality impact tool [18] to quantify who is benefitting from an intervention. While the use of this tool requires input of rich data (e.g., intervention uptake and completion by socio-economic group), participants identified this as a useful approach for enhancing decision making.

Another strategy highlighted by participants was related to addressing data shortages, through sharing of data and methodologies across countries. Participants discussed that digital solutions like synthetic data [24] may aid data sharing in line with data protection legislation across countries, including the sharing of high-quality registry data where available. External validity of intervention effects can be estimated through the presented work on transportability [19, 25, 26], to investigate whether an intervention would have similar effects in a different target population (e.g., in a different country). This was considered as a useful approach to help identify and reduce bias in economic evaluations, when generating evidence in countries with limited or unavailable data.

3.3 Broadening Perspectives

International and multidisciplinary collaboration was emphasised as a means to potentially overcome the identified challenges and apply a systems perspective when designing

and evaluating obesity interventions, similar to use in other areas of health research [27]. The COBWEB network was acknowledged as an example of a multidisciplinary, collaborative obesity research platform, with a wide and significant range of expertise and skills. To further consolidate ideas, perspectives and experience, participants suggested to connect with various stakeholders, including people living with obesity, and advocacy groups such as those representing children or tackling climate change. Further, participants recommended that policymakers, including those at transnational level, should be involved early to maximise reach and success chances. For example, involvement at EU level was recommended as a potential means to hold countries responsible for developing and measuring the achievement of obesity goals, similar to the climate action agenda. To achieve policy buy-in, participants advocated for the development of a comprehensive policy document outlining key definitions, measures, objectives, aims and plans agreed between collaborators. Additionally, participant discussions acknowledged that a focus on the wider determinants of health could help further in advocating interventions to policymakers, shifting away from the sole focus on individual responsibility and the associated stigma that can subsequently emerge.

3.4 Improving Health Economic Evidence-to-Policy Translation

While the defined terminology and simplifications in traditional health economic evaluations were perceived to facilitate effective communication between research and policy, participants emphasised that additional layers of data (e.g., from qualitative research) should be incorporated to inform decision making. The application of an implementation science approach to economic evaluations was recommended to explore and test new concepts or adapt interventions that have worked in other countries, in addition to maintaining traditional health economic approaches. The traditional cost-effectiveness analysis framework seeks to quantify intervention cost and outcomes to provide an objective decision on whether an intervention should be implemented. The integration of implementation science and economic evaluations would enhance the cost-effectiveness and implementation of obesity interventions and provide a far richer evidence base for the future sustainability of such interventions. For example, integrating additional data in health economic evaluations would support iterative and timely intervention research that involves multidisciplinary stakeholders, thereby strengthening the measurement of cost and benefits required for economic evaluation. Participants suggested that a Consolidated Framework for Implementation Research [28] should be developed to incorporate different ideas and stakeholders.

Although the workshop identified a wide array of topics (Fig. 1), we recognise that this breadth may have limited the opportunity for in-depth discussions on a more focused set of issues.

4 Conclusions

This paper highlights the pressing need to address the complexity and nuances of economic evaluations in obesity research. Through the collaborative efforts of a diverse group of stakeholders, the workshop identified key challenges, research needs and priorities, with implications for the study design and data collection relevant to economic evaluations of obesity interventions. Action is needed to define standards for data collection, data sharing and modelling, and integrating a systems perspective, underscoring the importance of innovative and multidisciplinary approaches in advancing the field. Addressing these challenges requires not only technical advancements but also a shift in perspective—moving beyond individual responsibility to tackle the wider determinants of obesity. Standardised approaches, outcomes and engagement with various stakeholders would allow for more comprehensive perspectives to feed into economic evaluations of obesity interventions and their sustainability across countries in the future.

As the complexity of obesity continues to grow, our collective efforts to develop effective, equitable and sustainable interventions must grow as well. We encourage researchers, policymakers, and other stakeholders to join us in advancing these priorities. Contact us via the COBWEB website [13].

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Code availability Not applicable.

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