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SUPPLEMENT ARTICLE

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A changed research landscape of youth's obesogenic behaviours and environments in the post-COVID-19 era

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Summary

The project 'Obesogenic Environment and Childhood Obesity' (OBECHO), carried out under the leadership of the International Institute of Spatial Lifecourse Epidemiology (ISLE), has reviewed all sufficiently reported studies of obesogenic environmental determinants published prior to 1 January 2019. Findings of the OBECHO project have formed the unprecedentedly inclusive evidence for policy-making and the establishment of the future research agenda regarding the obesogenic environment. Furthermore, the outbreak of the coronavirus disease 2019 (COVID-19) pandemic has made this evidence become an important benchmark record of how youths have interacted with the obesogenic environment in the pre-COVID-19 era. The implementation of lockdown measures worldwide for curbing COVID-19 transmission has been affecting not mere youth's lifestyle behaviours and weight status but, more fundamentally, obesogenic environments and hence youth-environment interaction patterns. However, COVID-19, although causing unfavoured changes, will speed up the transformation of the research landscape from traditional to modern modes for more reliable evidence. We should closely track and study those abnormalities caused by COVID-19 and the accompanying interventions.

KEYWORDS

behaviour, built environment, COVID-19, food environment, lifestyle, obesity, obesogenic environment, youth

The project 'Obesogenic Environment and Childhood Obesity' (OBECHO), carried out under the leadership of the International Institute of Spatial Lifecourse Epidemiology (ISLE),[1,2] has reviewed all sufficiently reported studies of obesogenic environmental determinants published prior to 1 January 2019.[3–22] Specifically, built, food and natural environmental determinants of youths' weight-related behaviours (e.g., physical activity [PA], sedentary behaviours and dietary behaviours) and outcomes (e.g., body mass index, overweight, obesity, waist circumference, waist-to-hip ratio and body fat) have been systematically reviewed. Findings of the OBECHO project have formed the unprecedentedly inclusive evidence for policy-making and the establishment of the future research agenda regarding the obesogenic environment, in order to better fight the obesity pandemic among youths.

Nevertheless, unexpectedly, the outbreak of the coronavirus disease 2019 (COVID-19) pandemic, occurring immediately after the OBECHO project, has made the OBECHO-derived evidence become an important benchmark record of how youths have interacted with the obesogenic environment in the pre-COVID-19 era. The implementation of lockdown measures worldwide for curbing COVID-19 transmission has been affecting not mere youth's lifestyles (e.g., PA and dietary behaviours) and weight status but, more fundamentally,

obesogenic environments and hence youth-environment interaction patterns, which can also, to some extent, reflect the broader human–environment interaction patterns.[23]

COVID-19 and the accompanying interventions (e.g., shelter-in-place) have been changing several aspects of the landscape of traditional obesogenic behavioural and environmental research, regarding both objective behavioural and environmental characteristics and theoretical hypotheses underlying human–environment interaction, which cannot be fully captured by the commonly used data and methods anymore and would instead propel the development of novel (combinations of) data sources and tools: four stand out.

First, the youth's lifestyles (perhaps behaviours as well) have been changed during the lockdown period. They have been experiencing and getting used to lifestyles with more consumption of ultra-processed, calorie-dense comfort foods (easy to be stocked up on), increased screen and sedentary time usually accompanied by increased snacking, less social gathering and PA, and reduced use of active transport, including walking and cycling, and especially public transport.[24] Hence, smartphone-based apps and wearable devices that are commonly used to capture humans' outdoor PA patterns would be insufficient to well describe the increased indoor activities. This would propel the increased use of ecological momentary assessment (EMA) and Internet of Things (e.g., smart furniture) for indoor behavioural data collection.[25] In addition, special attention for researchers should also be paid to some post-lockdown themes, such as compensatory eating and purchasing after lockdown.

Second, food environments and their use patterns among youths have been changed relative to those in the pre-COVID-19 era. They may have varied due to school closures and the shutdown of most food outlets during the lockdown period, especially the bankruptcy of some small-size restaurants including street food stalls. Moreover, online food ordering, considered to have played a neglectable role before, has significantly reduced traditional physical barriers for food outlets that are far from where one lives. For example, youths with overweight may have ordered unhealthful foods frequently from farther fast-food restaurants instead of the ones in their residential neighborhoods; hence, associations derived from traditional study designs and data may misguide local policy-making.[26] Therefore, the density of food outlets of certain types in residential neighborhoods and the proximity to the nearest food outlet of a certain type would be less influential on people's eating behaviours and their weight status, which is becoming gradually unneglected to most, if not all, obesogenic environmental research. Also, due to school closures, the food environment in school neighborhoods has become less influential than before,[27] although the ways in which youths would interact with the food environment after resuming school remain unknown. As a result, changes in neighbourhood food environments could not be accurately captured by static Geographic Information Systems data sets alone.[28] Instead, more novel types of data would gradually be required, rather than just warranted,[29] to investigate the association between food environments and weight status, such as retail purchasing data, website transaction data and food delivery data from food outlets and third parties. Also, given the reduced influence of physical barriers (e.g., travel distance) on people's food choice, EMA should be more utilized to elucidate the underlying reasons at decision-making moments.

Third, built environments and their use patterns have also been changed, compared with those in the pre-COVID-19 era. Although less apparent changes per se relative to food environments, built environments have been used less due to lockdown measures. Their use patterns in the post-COVID-19 era remain unpredictable, which may be affected by enforced measures and/or resultant behavioural changes. Thus, remote sensing data that are mainly used to capture the infrastructure of the built environment need to be supplemented by social sensing data and data from ground sensors, including street view photos, surveillance camera data, and public transport smart card data, in order to capture the actual use patterns of built environmental features.[30,31] These demands, again, urgently call for more frequent use of smartphone-based EMA. A downside of online and smartphone-based methods, which enable the accumulation of sufficiently large numbers of participants in a broad population and in a short period via online random recruitment (e.g., a snowball sampling method), is that the representativeness of participants may not be optimal compared with that of traditional controlled sampling strategies. New protocols are needed to standardize these modern procedures of participant recruitment and study implementation.

Fourth, future obesogenic environmental research will encounter methodological challenges. The year 2020 will be an outlier period in most, if not all, ongoing cohort studies, where the youth's routine behaviours and environmental exposure, usually assumed stable, have discontinued. For example, using Geographic Information Systems data in any other year to represent the youth's exposure to the obesogenic environment in 2020 would result in a temporal mismatch and thereby affect the findings. Avoiding such issues requires a higher reporting quality of spatial epidemiological studies in the future, which will also improve the comparability among studies.[32] The cohorts scheduled to be followed up in 2020 will also face difficulties in doing so (some have been cancelled), which will need better thoughts and ancillary approaches to help participants recall accurately after a quite long period and to validate the survey results. Whenever possible, a quick follow-up for even only basic weight-related outcomes (e.g., weight and waist circumference) should be considered via telephone or social media tools, which, to some extent, would enable researchers to systematically adjust weight changes during this unusual period among individuals. Also, more advanced methods (e.g., machine learning) and more complex modelling will be required to handle these big data.[33]

Given that social distancing orders, if lifted after short periods, may have to be periodically reinstated to control COVID-19 flare-ups,[24] the COVID-19 pandemic could to some extent cancel out the existing efforts of curbing the obesity pandemic without appropriate actions. For example, public health authorities and health policies

should consider not only to create healthy food and built environments in the neighbourhood but also to incorporate nutritional guidance into the online food ordering system and to provide reminders for indoor exercising via smartphone-based apps. Moreover, the impact of COVID-19 would be seen more in the most vulnerable regions and among the most vulnerable populations, which have already disproportionately suffered from the more obesogenic environment.[34] Special attention and tailored interventions are required for those regions and populations. Although COVID-19 has caused unfavoured changes, it can also open a window of opportunity for reflection and advancement, as it will speed up the transformation of the research landscape from traditional to modern modes for more reliable evidence. We should closely track and study those abnormalities caused by COVID-19 and the accompanying interventions and use advanced knowledge and tools to monitor obesogenic environments, nudge healthy behaviours, improve weight status and decrease (disparities in) obesity risk and chronic disease burden.

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CONFLICT OF INTEREST

No conflict of interest was declared.

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