Environmental Research 194 (2021) 110578

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

Review article

Reviewing the reliability of Land Use and Land Cover data in studies relating human health to the environment

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ARTICLE INFO

Keywords:
GIS
Nature
Green spaces
Environment and public health
Statistical models
Modelling

ABSTRACT

Background: In recent years, research has been increasingly devoted to understanding the complex human health-environment relationship. Nevertheless, many different measurements have been applied to characterize the environment. Among them, the application of Land Use and Land Cover (LULC) data is becoming more noticeable over time.

Aims: This research aims to analyse the reliability of Land Use and Land Cover data (LULC) data as a suitable describer of the environment in studies relating human health to the environment. With a specific focus on the methodologies using LULC data, we also examine the study designs and analytical methods that have been commonly performed so far.

Materials and Methods: We gathered studies relating human health outcomes to Land Use and Land Cover (LULC) data. A Boolean search limited to reviews was conducted in February 2019 using *Web of Science Core Collection* search engines. Five reviews were selected as our preliminary starting set of literature and from those, two backward snowballing searches were conducted. The first backward snowballing search used the reference lists of the first 5 reviews and revealed 17 articles. From these, the second search gathered 24 new articles also fulfilling the inclusion criteria established. In total, 41 articles were examined.

Results: Our main results reported that Land Use and Land Cover (LULC) data national level data was preferred over LULC international level data. However, this tendency seems to be strongly related to the specific aims of the articles. They essentially defined the living environment either through buffer zones, using the administrative boundaries wherein the individuals reside, or using the specific location of the individuals assessed. As for the characterization of the environment, authors performed 4 principal methodologies: extracting the percentage of green space, computing the "Land Use mix", recording the type of land cover, and using the percentage of tree canopy. Besides, all the articles included measurements in urban contexts and most of them evaluated the accessibility of individuals to their surroundings. Furthermore, it was clearly stated that the complexity of the topic and the challenging data leads authors to carry out advanced statistical methods and mostly cross-sectional designs with no causal relations.

Discussion and Conclusions: Land Use and Land Cover (LULC) data has been demonstrated to be a versatile tool supporting both local-focused studies with few individuals involved and broad territorial-scoped studies with huge populations. Promising synergy has been highlighted between Electronic Health Records (EHR) and LULC data in studies dealing with massive information and broader scopes with regards to the assessment of territorial realities. As this emerging topic matures, investigators should (1) elucidate subjects of ongoing debate such as the

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https://doi.org/10.1016/j.envres.2020.110578
Received 23 April 2020; Received in revised form 21 October 2020; Accepted 29 November 2020
Available online 14 December 2020