Paving the way towards sustainable cities by microbiome-based data

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Abstract:
In the last decades, a prominent increase of urbanization has moved more than half of the global population to the cities. The human-made spaces where individuals live, work, and socialize play a pivotal role in this urban landscape which have witnessed a shift of the natural niches of all living organisms, including microorganisms. This process triggered a reduction of microbial biodiversity that needs to be restored with urgency for environmental salubrity and ultimately human health.
Within Multilayered Urban Sustainability Action (MUSA), UniBiome project, a collaborative endeavor between scientists and students, aims to characterize the microbiome of two Italian universities – the University Milano-Bicocca and Politecnico di Milano as living laboratories assessing urban health quality.
During a two-season sampling campaign, around 160 volunteer students contributed with skin and fecal samples and 520 environmental samples were collected. Their microbiomes were characterized by amplicon-based sequencing and bioinformatics analysis.
The results will chart the intricate interplay between human and environmental microbiomes and elucidate the differences in microbial signatures across diverse urban areas. Preliminary outputs show the presence of key microbial taxa for specific university indoor and outdoor spaces. Human-related microbiomes differ according to student lifestyle, nutrition habits, and social exposure. Merging the microbiome of the built environments with the students' will depict pathways of microbial routes, pattern of their interaction, and will help in defining the level of health quality in an urban contest.
This comprehensive mapping will pave the way towards science-based and microbiome-oriented interventions that can harmonize urban renovation with human and environmental health.