Global indicator data from the Global Healthy and Sustainable City Indicator Study Collaboration
21 June 2021

Output data prepared for analysis of 25 diverse global cities included in the Global Healthy and Sustainable City Indicator Study Collaboration study. The dataset will be described in detail in a forthcoming publication (under review, September 2021).
Data outputs were generated through use of the global-indicators software tool, designed for this study and available from:
https://github.com/global-healthy-liveable-cities/global-indicators

Further detail on the methods used is provided in the following publication:

Liu, S., Higgs, C., Arundel, J., Boeing, G., Cerdera, N., Moctezuma, D., Cerin, E., Adlakha, D., Lowe, M. and Giles-Corti, B. (2021), A Generalized Framework for Measuring Pedestrian Accessibility around the World Using Open Data. Geogr Anal. https://doi.org/10.1111/gean.12290

Variable	Variable description
Continent	*Continent*
Country	*Country*
ISO 3166-1 alpha-2	*Two digit standard country reference code*
City	*City*
Urban covariates	
Area (sqkm)	*Urban study region area (km²)*
Population estimate	*Urban study region population estimate (2015; GHS)*
Population per sqkm	*Population per square kilometre of urban study region*
Intersections	*Intersection count (2020 OSM, derived using OSMnx)*
Intersections per sqkm	*Intersections per square kilometre of urban study region*
E_EC2E_T15	*Total emission of CO_2 from the transport sector, using non-short-cycle-organic fuels in 2015 (tonnes per annum)*
E_EC2O_T15	*Total emission of CO_2 from the energy sector, using short-cycle-organic fuels in 2015 (tonnes per annum)*
E_EPM2_T15	*Total emission of PM 2.5 from the transport sector in 2015 (tonnes per annum)*
E_CPM2_T14	*Total concertation of PM 2.5 for reference epoch 2014 (micrograms per cubic meter)*
urban_sample_point_count	Number of points generated along derived pedestrian network for which estimates were calculated within this study region
Within city, percentage of population with access within 500 metres walking distance to…	
pop_pct_access_500m_fresh_food_market_binary	*a fresh food market or supermarket*
pop_pct_access_500m_convenience_binary	*a convenience store*
pop_pct_access_500m_pt_osm_any_binary	*any OSM-sourced public transport*
pop_pct_access_500m_public_open_space_any_binary	*any public open space*
pop_pct_access_500m_public_open_space_large_binary	*public open space larger than 1.5 hectares*
pop_pct_access_500m_pt_gtfs_any_binary	*any GTFS-sourced public transport*
pop_pct_access_500m_pt_gtfs_freq_30_binary	*public transport with average day time weekday service frequency of 30 minutes or less*
pop_pct_access_500m_pt_gtfs_freq_20_binary	*public transport with average day time weekday service frequency of 20 minutes or less*
pop_pct_access_500m_pt_any_binary	*any public transport*
Within city, population weighted average…	
pop_nh_pop_density	*local neighbourhood population per square kilometre*
pop_nh_intersection_density	*local neighbourhood intersections per square kilometre*
pop_daily_living	*Daily living score (access to supermarket, convience, and public transport)*
pop_walkability	*Walkability index (sum of z-scores)*
Between city, population weighted average	
all_cities_pop_z_nh_population_density	*local neighbourhood population per square kilometre*
all_cities_pop_z_nh_intersection_density	*local neighbourhood intersections per square kilometre*
all_cities_pop_z_daily_living	*Daily living score*
all_cities_pop_walkability	*Walkability index (sum of z-scores)*
Within city, spatial average	
local_nh_population_density	*local neighbourhood population per square kilometre*
local_nh_intersection_density	*local neighbourhood intersections per square kilometre*
local_daily_living	*Daily living score (z-score relative to all cities)*
local_walkability	*Walkability index (sum of z-scores relative to all cities)*
Between city, spatial average	
all_cities_z_nh_population_density	*local neighbourhood population per square kilometre*
all_cities_z_nh_intersection_density	*local neighbourhood intersections per square kilometre*
all_cities_z_daily_living	*Daily living score (z-score relative to all cities)*
all_cities_walkability	*Walkability index (sum of z-scores relative to all cities)*

Indicator	Units	GHS UCDB 2015 (2019)	GHS POP 2015 (2019)	OSM (2020)	GTFS (mixed; 2019)	Other	Comments
		Data sources					
Descriptive variables							
Urban study region area	km²	x				x	Urban study region boundaries, derived in consultation with collaborators were used in calculation of all indicators
Urban study region population estimate	2015; GHS	x	x			x	Overall urban population estimate for the study region
GNI per capita classification (2021)	Lower, Lower-middle, Upper-middle, High					x	The World Bank 2021 fiscal year GNI per capita classification (Atlas method) was included for contextualisation of study regions
Population per square kilometre		x	x			x	Overall study region urban population density estimate
Intersection count	2020 OSM, derived using OSMnx	x		x		x	OSMnx was used to derive a pedestrian network and cleaned intersections from OSM; this city-wide intersection count was not used or reported in the
Total emission of CO2 from the transport sector, using non-short-cycle-organic fuels in 2015	tonnes per annum	x		x			City scale summary for GHS urban centres, where available
Total emission of CO2 from the energy sector, using short-cycle-organic fuels in 2015	tonnes per annum	x		x			City scale summary for GHS urban centres, where available
Total emission of PM 2.5 from the transport sector in 2015	tonnes per annum	x		x			City scale summary for GHS urban centres, where available
Total concertation of PM 2.5 for reference epoch 2014	micrograms per cubic meter	x		x			City scale summary for GHS urban centres, where available
Sample point count	points	x	x	x		x	Points generated along pedestrian network for 250m diagonal urban hexagonal grid regions with population estimates greater than 5.
Percentage of population with access to							Pedestrian network distance indicators of access within 500m, evaluated for hexagonal grid cells and weighted for population percentage estimate
a fresh food market or supermarket	%	x	x	x		x	Including supermarket, fresh food grocers and food markets
a convenience store	%	x	x	x		x	Including newsagencies and convenience stores where basic staples and prepared food items may be purchased
any public open space	%	x	x	x		x	Includes squares, parks and other publicly accessible areas of natural land for leisure and recreation purposes
public open space larger than 1.5 hectares	%	x	x	x		x	As above, restricted to areas with large publicly accessible areas
any OSM-sourced public transport	%	x	x	x		x	An access indicator using OpenStreetMap sourced public transport stop locations, useful where GTFS data were not available or adequate
any GTFS-sourced public transport	%	x	x	x	x	x	GTFS sourced public transport stop locations
any public transport stop (OSM or GTFS)	%	x	x	x	x	x	The best estimate of access using either OpenStreetMap or GTFS sourced data (noting that both are imperfect)
public transport with regular service (30 mins or better)	%	x	x	x	x	x	Transport measure accounting for 30 minute or less average week day day time service frequency
public transport with regular service (20 mins or better)	%	x	x	x	x	x	Transport measure accounting for 20 minute or less average week day day time service frequency
Local walkable neighbourhood indicators		x	x	x		x	Unweighted (spatial) and population weighted city summary measures, both within city (in absolute units), relative to all cities (as z-scores)
population per square kilometre	density	x	x	x		x	Average of estimated population density within the 1000 metre local pedestrian network catchments generated within each hexagon
intersections per square kilometre	density	x	x	x		x	Average of estimated intersection density within the 1000 metre local pedestrian network catchments generated within each hexagon
Daily living score	/3	x	x	x	x	x	Sum of binary access indicator scores to supermarket, convience, and public transport (OSM or GTFS), servicing as a proxy of land use mix
Walkability index	sum of z-scores	x	x	x	x	x	Sum of z-scores (within city, and between city) of population density, intersection density and daily living score