Development after displacement: Using OSM data to measure Sustainable Development Goal indicators at informal settlements

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In 2015, the United Nations introduced 17 Sustainable Development Goals (SDGs) and 169 associated targets as part of its 2030 Agenda. One hundred and ninety three countries declared their commitment to "leave no one behind" in the shared pursuit of SDGs, yet 250 million people around the globe are estimated to be missing from SDG progress assessments. This presentation focuses on one category of these "Missing Millions": refugees and internally displaced people (IDPs) living in informal settlements around the globe. Over two-thirds of the global refugee population lives in a "protracted refugee situation" where basic rights and access to economic and social services remain unfulfilled after years and sometimes generations in exile [1]. However, in part due to the lack of reliable, open information on the locations of informal settlements [2], refugees and IDPs have been systematically excluded from national censuses, representative surveys, and global settlement and population data sets [3]. Given that similar conditions may contribute to partial or biased SDG assessments at refugee and IDP settlements, the goal of this work is to develop a geographically consistent and open schema of SDG indicators relevant for the Missing Millions living in informal settlements.

Though there has been notable progress towards developing Earth Observation (EO) based SDG indicators [4], many amenities or public services such as a school, health center, or sites of potable drinking are not readily identified with satellite imagery. While OpenStreetMap (OSM) data excel at capturing site-specific features and have nominally global coverage, their use in evaluating SDG indicators has remained limited [5]. In examining the value of OSM data to support an SDG monitoring approach that is explicitly inclusive of these highly vulnerable populations, we considered the relatively data rich case study of across 23 settlements in Uganda. We incorporated UNHCR refugee settlement location and boundary data collected by Uganda Humanitarian OpenStreetMap Team, queried all OSM features within or nearby refugee settlements as well as non-refugee settlements, and identified all OSM feature tags. We culled this collection of OSM tags to those with direct relevance for SDG 3 (health and well-being), SDG 4 (inclusive education),

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SDG 6 (clean water, sanitation), and SDG 11 (sustainable communities). We then measured the spatial proximity, thematic variability, date of appearance, and version history for each OSM tag at Ugandan refugee settlements, and assessed the presence and relevance of these tags across a broader sample of refugee settlements in 22 other African countries. We found that the majority of SDG-relevant tags are related to the amenity key and paired with values related to clinics, schools, toilets, and drinking water. The geographic distribution of these key-value pairs is not consistent across refugee settlements: many settlements lack any SDG-relevant OSM data while others may only contain data for a given SDG.

This variability speaks to the complex and varied history of OSM data collection/creation at refugee settlements, the challenges of retroactively including OSM data collected over many years and various campaigns within a single SDG assessment schema, and the difficulty of separating a true absence of SDG indicators from a false absence due to an omission of OSM data. Indeed, many data collection biases that contribute to the variability in OSM tags within and between informal settlements challenge the development of a globally relevant schema for using OSM data to assess SDG indicators at refugee settlements. For example, the presence of SDG-relevant OSM features at some settlements may reflect past humanitarian or development mapping, while other informal settlements with less attention in OSM may lack any SDG-relevant OSM features. The absence of SDG-relevant OSM features across so many informal settlements highlights the need for a rigorous assessment of potential bias in settlement-level OSM data availability as well as consistency in OSM metadata attribution to support linkages to SDG indicators consistent in time and space. Further research to characterize the conditions and consequences of using OSM data for SDG assessment may help refine OSM on-the-ground and online volunteer campaigns, guide a field-based assessment of the SDG schema, inform global end users of OSM data in settlement-level SDGs assessments, and bridge the wide gap between EO- and OSM-derived SDG indicators at informal settlements.

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