University of Nottingham
Rights Lab

Special Rapporteur on Contemporary Forms of Slavery - Call for input on the use of technology in facilitating and preventing contemporary forms of slavery

Written response submitted on behalf of the Rights Lab, University of Nottingham, April 2023

About the Rights Lab

The Rights Lab delivers research to help end modern slavery and human trafficking. We are the world's largest group of modern slavery and trafficking researchers, and home to many leading experts. Through our research programmes, we deliver new and cutting-edge research that provides rigorous data, evidence and discoveries for the global effort to end slavery and trafficking. More information about the Rights Lab is available at: www.nottingham.ac.uk/rights-lab. For further information regarding the contents of this submission, please contact Vicky.Brotherton@nottingham.ac.uk.

Q1. Is there evidence of modern technology (e.g., platforms including social media such as Facebook, Instagram and Twitter, websites, applications, artificial intelligence, the dark web) being used to recruit and subject people to contemporary forms of slavery in your country?

Research led by Dr. Ben Brewster during the Covid-19 pandemic highlighted the impact of the COVID-19 on Child Criminal Exploitation (CCE) in the UK and provided anecdotal evidence that social media and other online technologies are being in the criminal exploitation of young people to supply and distribute illegal drugs across the UK.[1]

This model of drug distribution is often termed county lines 'County Lines' (CL) and refers to the domestic migration of drugs from urban to rural and coastal areas in the UK, often across different local authority (or 'county') jurisdictions, and using a branded mobile phone 'line'.[2] The County Lines drug supply model relies on the criminal exploitation of children and adolescents as 'runners' to move and sell drugs in areas far away from their homes. The use of young people in these operations offers distance and anonymity for dealers, providing them the opportunity to manage drug supply remotely.[3] CL often associated with British males, particularly those who have histories of being missing from home, being looked after/in the care system, excluded from mainstream education, or who have experienced serious youth violence - factors which are also associated with increased likelihood of criminal offending.[4]

Previous documentation of CCE's social economics - including the grooming of vulnerable children and teens, the cuckooing of residential properties as distribution ('trap') houses, and the physical transportation and sale of illegal narcotics - has previously demonstrated a reliance on face-to-face interaction. However, the restrictions placed on these activities during the pandemic foregrounded issues relating to the use of social media and mobile messaging applications in these processes.

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[1] Ben Brewster et al, "Covid-19 and child criminal exploitation in the UK: implications of the pandemic for county lines," *Trends in Organized Crime* (2021).
[2] National Crime Agency, "Intelligence Assessment: County Lines, Gangs, and Safeguarding" (2015).
[3] Simon Harding, "County lines: exploitation and drug dealing among urban street gangs," (2020).
[4] Rachel Sturrock & Lucy Holmes, "Running the risks: the links between gang involvement and young people going missing," *Catch-22* (2015).

Brewster et al.'s, research findings are based upon interviews with 46 key informant practitioners that worked in law enforcement or care settings with young people with previous or ongoing exposure to CCE. They found that while face-to-face opportunities for grooming and coercion were restricted, the contact, recruitment, and criminal exploitation of young people was increasingly being mediated online, or through other forms of computer-mediated communication. Despite this, professionals interviewed for the research demonstrated a lack of confidence in their understanding of exploitation in online settings.

Additionally, professionals interviewed as part of research were ubiquitous in suggesting that young people's exposure to harm, abuse, and exploitation online had increased across their caseloads during the pandemic, fuelling ongoing concerns that perpetrators are using platforms such as Snapchat and Instagram in both criminal and sexual exploitation, as part of their coercive repertoire. In addition to their use in the recruitment of young people into criminal exploitation, certain social media platforms were also linked to the facilitation of drug supply itself, with Instagram allowing the dissemination of drug-related imagery in large quantities and Snapchat providing quick-fire advertisements that often disappear within seconds.

Snapchat was specifically referenced by almost all interviewees being increasingly important for the logistical movement of drugs to unknown localities, where perpetrators were reported to infiltrate Snapchat groups in newer or less developed drug markets, relying upon young people to map part of their journey and refer their friends for participation in end-user transactions. Though there was clear recognition of growth in social media use, participants were typically unable to elaborate on specifics– indicating that it remains a significant knowledge gap among those working directly with young people.

Q8. Is there evidence of modern technology (e.g. applications, artificial intelligence and blockchain technology) being used to prevent contemporary forms of slavery? If so, please provide details.

Since 2016, a team led by Professor Doreen Boyd within the Rights Lab at the University of Nottingham has used remote sensing, machine-learning and citizen science to map sites where there is a high risk of contemporary forms of slavery.

One article provided wall-to-wall data on kilns in the 'Brick Belt' of South Asia. The article used a data sampling approach and citizen science to generate testing data, and delivered the first robust estimate: 55,387 kilns (95% confidence interval). The article argued that one of the biggest barriers to ending slavery is a lack of spatially explicit and scalable data. The article was the first demonstration of how remote sensing for EO can tackle slavery.[5]

A second article about the Brick Belt developed an advanced machine-learning method for rapid, accurate and repeatable automated mapping of kilns. The team trained a contemporary deep-learning classifier founded on region-based convolution neural networks to classify brick kilns, applied a second classifier to produce a map with an overall accuracy of 94.94%, and argued that this accurate map could help to direct antislavery activity on the ground.[6]

[5] Doreen Boyd et al, "Slavery from Space: Demonstrating the Role for Satellite Remote Sensing to Inform Evidence-Based Action Related to UN SDG Number 8," *ISPRS Journal of Photogrammetry and Remote Sensing* 142 (2018): 380-388.

[6] Giles Foody et al, "Earth Observation and Machine Learning to Meet Sustainable Development Goal 8.7: Mapping Sites Associated with Slavery from Space," *Remote Sensing* 11.3 (2019): 266.

A third article about the Brick Belt applied satellite remote sensing data and machine learning to the first rigorous spatiotemporal mapping of the location of every brick kiln across the Brick Belt, estimate the construction date of each brick kiln using the satellite record, explore the relationship between supply and demand for the bricks manufactured in the kilns and understand the drivers for brick kiln installation, and quantify how this industry, known to be underpinned by exploitative labour practices, has an impact on the environment.[7]

An article about citizen science also used the example of the Brick Belt to establish the benefits of using citizen science data in EO projects, namely to produce high-quality data for training/validation datasets.[8]

Another article used remote sensing methods to assess the location and impacts of fish-processing activities in Bangladesh's mangrove forests. The article identified ten fish-processing camps, including in locations where prohibited human activity results in the destruction of protected areas. Its spatial and temporal analysis revealed the camps' operational and seasonal trends and linked these findings to the bidirectional causal relationship between slavery and environmental degradation.[9]

Turning to agriculture, an article focused on exploitation in strawberry production. Through satellite remote sensing, it first identified 50 informal settlements hosting migrant workers in Southern Greece. It then applied a multi-criteria decision analysis (MCDA) method to a subset of six informal settlements in order to evaluate their labour exploitation risks based on eight criteria and show how a multi-method approach can be used for data-driven prioritization of interventions against labour exploitation.[10]

The team also focused on tree loss and modern slavery in Brazil, Ghana, Indonesia, and Mozambique. An article used EO data and derived data to estimate the risk for slavery-related tree loss, revealing the full co-occurrence of slavery and tree loss due to mining, illegal logging, and agriculture. It argued that the conservation and antislavery communities could benefit by working together.[11]

Two further articles then focused on mining and used remote-sensing to identify cobalt mines in the Democratic Republic of the Congo (DRC). One tested the feasibility of a key method, teamed with high temporal frequency imagery, for monitoring mining activity in the DRC's "Copperbelt." It showed that the method can: (i) separate mining and non-mining areas based on surface motion values; and (ii) distinguish different mine types.[12] A second article quantitatively assessed the cumulative impact of mining activities on the landscape of a prominent cobalt mining area in the DRC. It assessed land

[7] Doreen Boyd et al, "Informing Action for United Nations SDG Target 8.7 and Interdependent SDGs: Examining Modern Slavery from Space," *Humanities and Social Sciences Communications* 8.111 (2021)

[8] Doreen Boyd et al, "Citizen Science for Earth Observation (Citizens4EO): Understanding Current Use in the UK," *International Journal of Remote Sensing* 43.8 (2022): 2965-2985.

[9] Doreen Boyd et al, "Remote Sensing of Fish-Processing in the Sundarbans Reserve Forest, Bangladesh: An Insight into the Modern Slavery-Environment Nexus in the Coastal Fringe," *Maritime Studies* 19 (2020): 429-444.

[10] Alexander Trautrims et al, "A Multi-Method Approach to Prioritize Locations of Labor Exploitation for Ground-Based Interventions," *Production and Operations Management* 30.12 (2020): 4396-4411.

[11] Doreen Boyd et al, "Understanding the Co-Occurrence of Tree Loss and Modern Slavery to Improve Efficacy of Conservation Actions and Policies," *Conservation Science & Practice* 2.5 (2020): e183.

[12] Doreen Boyd et al, "Investigating the Potential of Radar Interferometry for Monitoring Rural Artisanal Cobalt Mines in the Democratic Republic of the Congo," *Sustainability* 12 (2020): 9834.

cover patterns over time and the interplay between mine features and the landscape structure to help quantify the true scale and impact of cobalt mining in the DRC.[13]

Across all nine articles, the researchers explained that remote sensing can: (i) produce proxy data for slavery and exploitation risk; (ii) bring a new methodological rigour to prevalence and risk estimation; (iii) produce mapping data for areas that are physically inaccessible to ground surveying techniques; and (iv) deliver geospatial coordinates for high-risk sites that can aid stakeholders' strategy and intervention development.

One major example of the application of this research to prevent contemporary forms of slavery is in India. The areal extent of the 'Brick Belt' that runs across South Asia is 1,551,997 km2 and crosses country and regional borders. After using remote-sensing methods to produce spatially-explicit maps of all kilns in the Brick Belt, Professor Boyd and the Rights Lab are delivering the maps and underlying data in different formats to NGOs and intergovernmental organisations in India, to aid their understanding of the scale and location of the industry and therefore their action in the form of community prevention, liberations, inspection and regulation.

The India-based NGO Volunteers for Social Justice (VSJ) is currently using these data and maps to liberate bonded labourers from kilns in northern India. VSJ has worked since 1985 to identify and liberate bonded labourers. The kiln mapping enables VSJ to target attention on specific kilns as well as provide formal evidence to gain permission to undertake a raid and then plan the raid's logistics of a raid. The detailed maps are used across VSJ's multi-stage liberation process, and VSJ has now successfully conducted multiple raids on brick kilns and liberated 183 bonded labourers in 2023 (until April) using this new approach. VSJ also has used this data for other areas of its work on brick kiln labour, including on improving working conditions, securing unpaid wages and access to welfare, and running an awareness campaign for workers about bonded labour. As it confirms: "The mapping from the University of Nottingham has therefore revolutionised our work, changing how we prioritise activity and target our resources."[14]

Professor Boyd and the Rights Lab team is also working with the UNDP India Accelerator Lab to deploy the maps and data. Working with Boyd, UNDP developed a GeoAI platform to help regulators take action on brick kilns that do not comply with environmental and labour regulations. The platform displays tens of thousands of brick kilns, and an accompanying mobile app is used by inspectors to select specific kilns for ground-level inspection. As UNDP explains, before this remotely-sensed data on kiln numbers, location and compliance, "inspectors had no data-driven way to select kilns for inspection." It enables inspectors to more efficiently target non-compliant kilns for inspection. Inspections were first piloted on all 162 kilns in one district, and the app's next roll-out in another state covered 9,000 kilns. UNDP notes that the impact of this data and maps "on the governance of the operations of the brick kilns cannot be overstated. It has led to a level of scrutiny…never before possible, and on-the-ground action in response."[15]

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[13] Doreen Boyd et al, "Landscape Analysis of Cobalt Mining Activities from 2009 to 2021 Using Very High Resolution Satellite Data (Democratic Republic of the Congo)," *Sustainability* 14:15 (2022): 9545.

[14] Letter and photographs on file from VSJ. See also VSJ twitter updates, for example: "VSJ freed 9 bonded labourers…."

[15] Letter on file from UNDP India Accelerator Lab. See also Swetha Kolluri, Rozita Singh, and Dr. Krishnan S Raghavan, "How a GeoAI platform is helping target brick kiln hotspots of air pollution," November, 19, 2020:; and "Tech for Clean Air and Blue Skies," September 7, 2022.