



**Designing inclusive health systems for forcibly displaced persons :
Trust, technology and a person-centric framework**

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Biomedical Engineering and Global Health

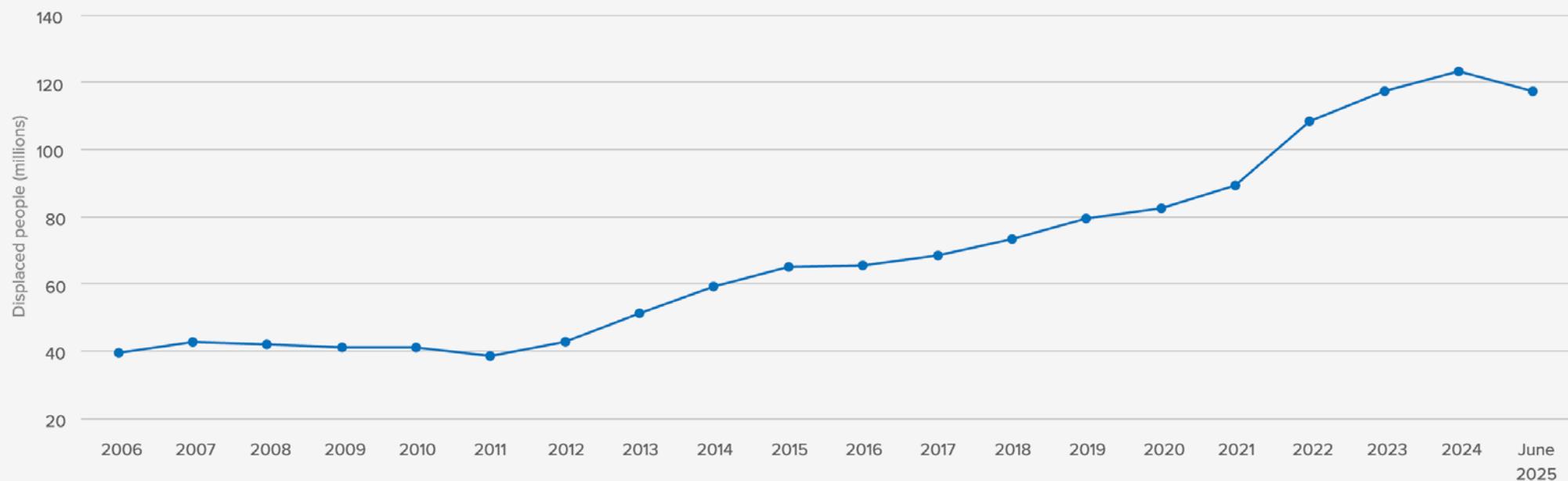
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Global forced displacement trend over the last 20 years

At the end of June 2025, 117.3 million people worldwide were forcibly displaced as a result of persecution, conflict, violence, human rights violations or events seriously disturbing public order.



Source: [Mid-Year Trends 2025](#), 4 November 2025.

Pakistan - Stateless or at risk of statelessness

Islamic Republic of Pakistan

2020

UNHCR Pakistan's Protection and Solutions Strategy 2019-2021 provides a way forward in approaching the statelessness issue and lays out two broader objectives for interventions in the statelessness area: 1) the granting of Pakistani citizenship as a way to access rights and services, and 2) sensitization of diverse stakeholders and advocacy for accession to the 1954 and 1961 statelessness conventions.

In 2020 UNHCR, together with a national partner, continued a legal assistance project for stateless persons in Karachi. The project covered the populations of Bengalis, Biharis and Rohingyas in Machar Colony, Karachi. This population is estimated to form 68% of the total population of Machar Colony, amounting to approximately 700,000 individuals. During the project implementation period, the partner provided legal advice and assistance to a total of 3,275 individuals (the original target was set at 2,500 individuals). The legal advice and assistance provided by the partner mainly related to acquiring identity documentation through follow-up with relevant governmental authorities, including the National Database & Registration Authority (NADRA), the office of the District Commissioner Karachi and the Intelligence Bureau. The partner filed a

Anthropological effects on disease burden

Toxicity and waste due to weapons of war

Metals, a common presence in wastewater, interact with antibiotic residues, altering their bioactivity and posing immediate health risks.

Unmanaged trash could reach 155-265 megatons per year by 2060. Among the immediate health risks microplastics pose, they can further harm human and environmental health by carrying and disseminating pollutants and pathogens.

Metals and microplastics contribute to antimicrobial resistance (AMR) by interacting with antibiotic residues, altering their bioactivity, and serving as carriers for resistant pathogens, thereby exacerbating the spread of AMR.





Comment | [Open access](#) | Published: 25 October 2023

The contribution of human conflict to the development of antimicrobial resistance

[Scott J. C. Pallett](#) , [Sara E. Boyd](#), [Matthew K. O'Shea](#), [Jessica Martin](#), [David R. Jenkins](#) & [Emma J. Hutley](#)

[Communications Medicine](#) **3**, Article number: 153 (2023) | [Cite this article](#)

Metal Ions and their Effects on Antimicrobial Resistance Development in Wastewater

[Indorica Sutradhar](#)¹, [Prinjali Kalyan](#)¹, [Kelechi Chukwu](#)², [Akebe Luther King Abia](#)^{2,3}, [Joshua Mbanga](#)², [Sabiha Essack](#)², [Davidson H Hamer](#)^{4,5,6}, [Muhammad H Zaman](#)^{1,6,7,8,*}

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PMCID: PMC10312816 PMID: [37398478](#)

 | Environmental Microbiology | Research Article | 11 March 2025



Effects of microplastic concentration, composition, and size on *Escherichia coli* biofilm-associated antimicrobial resistance

Authors: [Neila Gross](#) , [Johnathan Muhvich](#), [Carly Ching](#), [Bridget Gomez](#), [Evan Horvath](#) , [Yanina Nahum](#), [Muhammad H. Zaman](#)  | [AUTHORS INFO & AFFILIATIONS](#)

<https://doi.org/10.1128/aem.02282-24> |  Check for updates

News | Refugees

Lead poisoning fears at Greek refugee camp built on military site



Fragments of old ammunition have been found at Kara Tepe, raising fears of lead poisoning [Courtesy: Aegean Boat

The presence of microplastics alone in the environment facilitates clinically relevant resistance rates in multiple antibiotics (multidrug resistance)

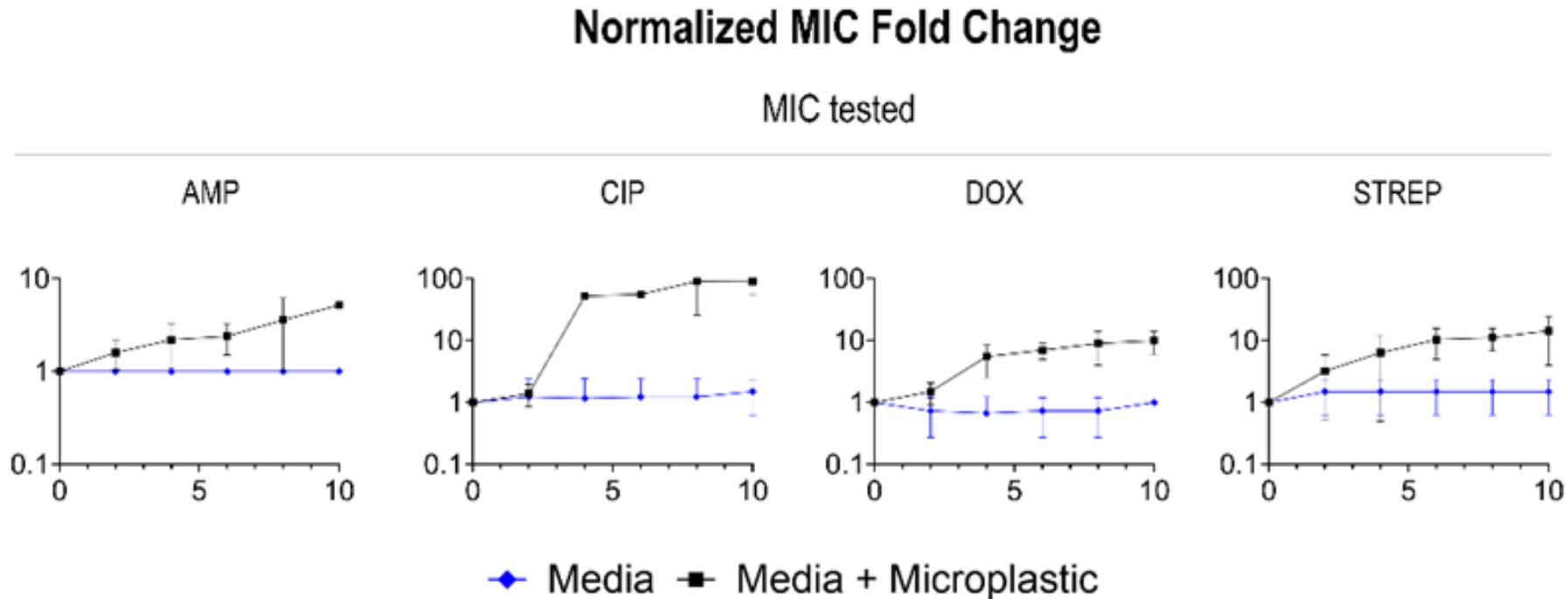


Figure 1. Normalized 10-day time (x-axis) series fold change (y-axis) of 500- μm diameter polystyrene MPs at 40 MP/mL, grown up in LB and then tested for the MIC in all four antibiotics (left to right: ampicillin, ciprofloxacin, doxycycline and streptomycin).

Statelessness & Health Access Framework

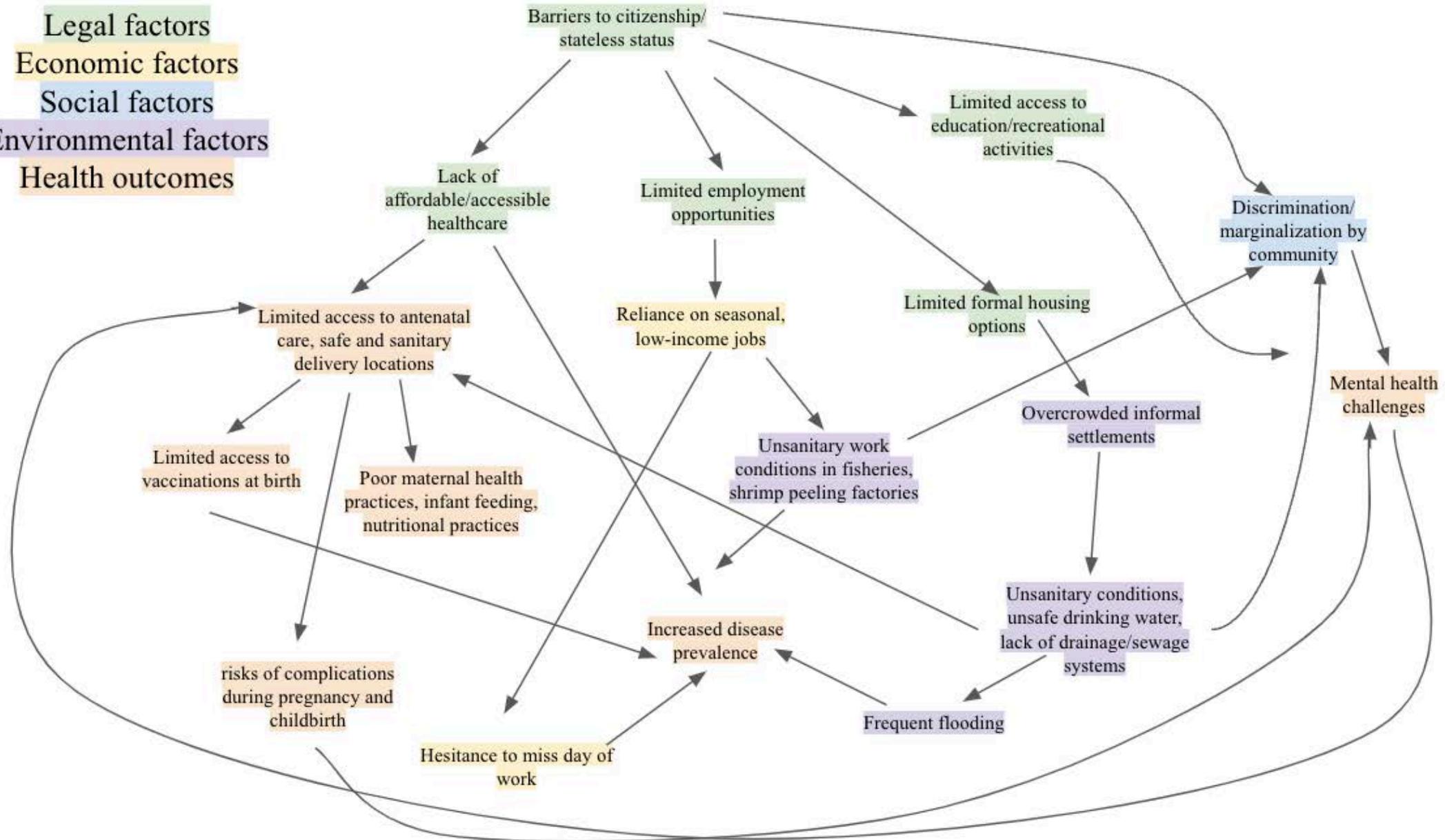
- **Trust**
 - **Information**
 - **Providers**
- **Social network**
 - **Robustness of network**
 - **Memory of network**
- **Regulatory Framework**
 - **Formal and informal services and providers**

For Pakistan's over three million stateless people, COVID-19 jabs out of reach



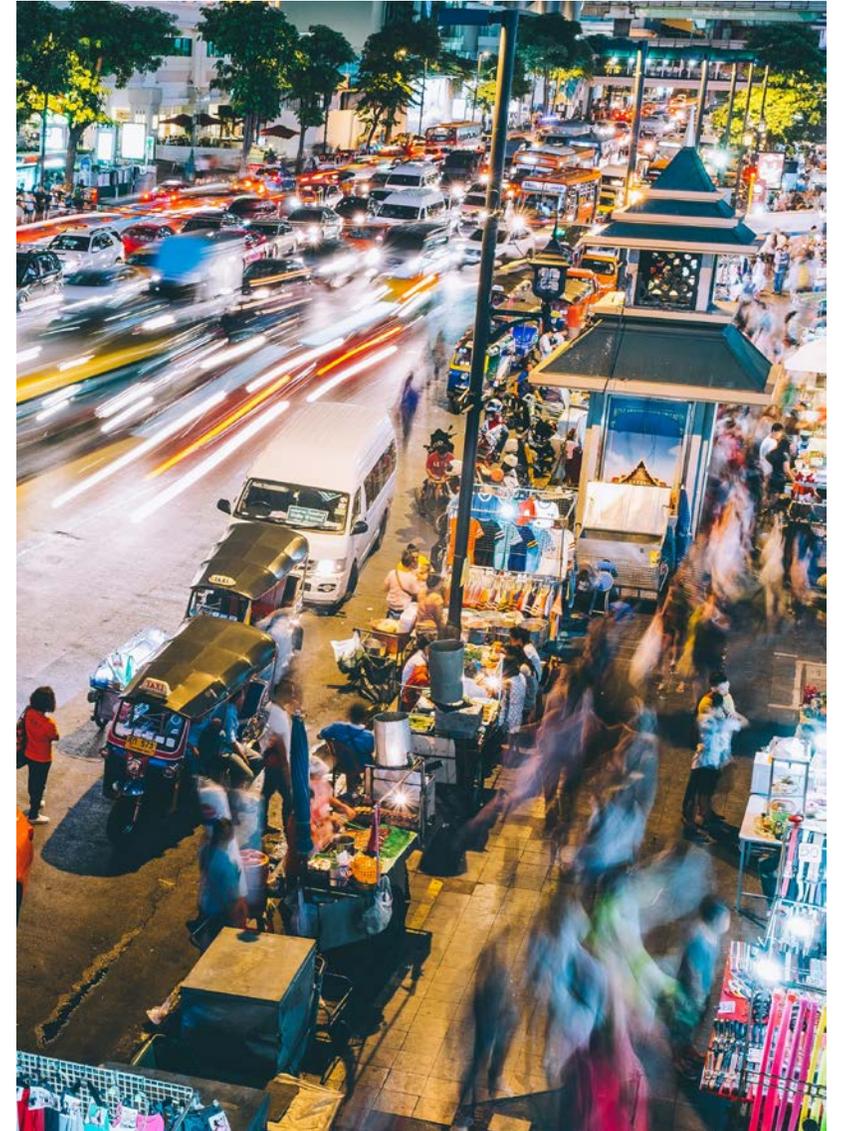
Afghan refugees wait at the registration centre in the Pakistani city of Peshawar on June 23, 2016.
(AFP/File)

Legal factors
 Economic factors
 Social factors
 Environmental factors
 Health outcomes



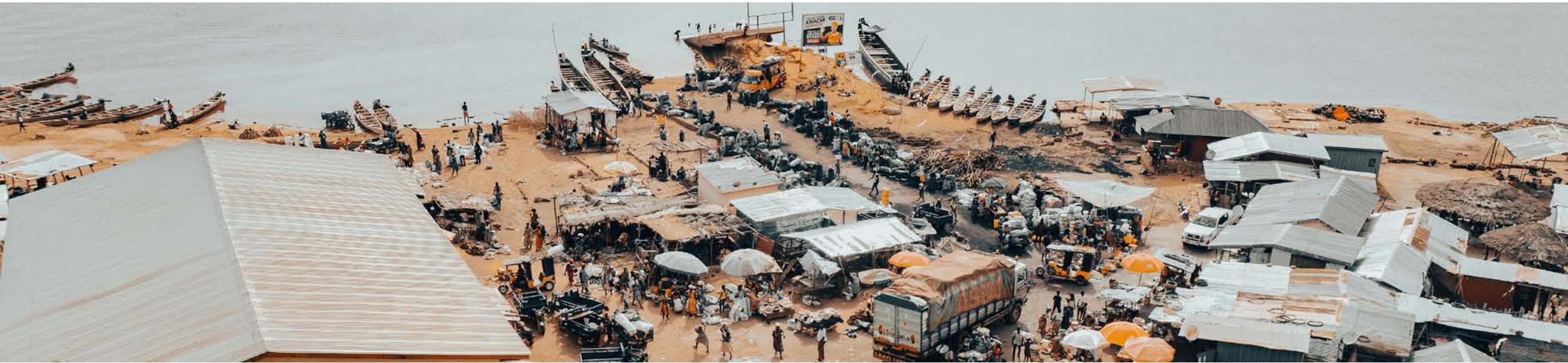
Thailand

- In 2021 Thailand incorporated stateless students into the national healthcare system
- In 2025, Thailand resolved the legal status of 100,000 stateless persons
- Documented migrants can join the national social security scheme, and all migrants can enroll in the Migrant Health Insurance Scheme



Ghana

- Social services for refugees and host communities are integrated in both camps and urban areas
- Refugees in Ghana can access services through the National Health Insurance Scheme (NHIS)
- People at risk of statelessness in Ghana can also enroll in the NHIS though enrollment is still low



Health Access in Displacement Settings:

Towards a Systems-Level Understanding

- Thinking of health in the continuum of care through a systems level understanding – macro and micro, natural, social sciences and humanities
- Co-existence of various communities (old and new refugees, IDPs, stateless persons and returnees)
- Understanding how does the nexus of trust, social network and regulation play a role in emerging communities versus protracted crises.
- Recognizing the role of technology and its weaponization in settings with communities that have few rights and resources.
- Who collects data and why? Challenges of data quality, access, ethics and integration in decision making
- The possible role basic science and discovery can play in understanding disease origin, dynamics and viable strategies to mitigate the risk.

CRITICAL FORCED DISPLACEMENT

ESSAYS

OP-EDS

BOOK REVIEWS

VISUAL ART

POETRY



Joy and Resilience in Machar Colony

Photographer Qasim Ali provides a poignant and insider's glimpse into the daily life, joys, and struggles of the residents of Machar Colony.

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