The intersection of socioeconomic deprivation and antimicrobial resistance: refocusing on a key determinant

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In *The Lancet Microbe*, Charlotte Ho and colleagues highlight key issues relating to antimicrobial resistance including access to antibiotics, antimicrobial stewardship, and resistance surveillance, as well as the potential role of artificial intelligence in addressing these challenges.[1] Despite concerted efforts, antimicrobial resistance remains a major threat to global health security accounting for approximately 9% of all global deaths.[2] The factors driving antimicrobial resistance are complex, but antimicrobial stewardship, which focuses on preventing inappropriate prescriptions and reducing prescription numbers in line with national and international targets, remains a key intervention. WHO introduced the AWaRe (Access, Watch and Reserve) classification of antibiotics in 2017 to support antimicrobial stewardship at local, national, and global levels and the categories were updated in 2023. On Jan 29, 2025, the United Kingdom Health Security Agency updated the UK-AWaRe antibiotic list after collaborating with 60 experts from across the four nations in the UK. This list guides health-care professionals in primary and secondary care on the use of 90 antibiotics.

Emerging data from the USA has identified notable clusters of antimicrobial resistant organisms in areas with high levels of socioeconomic deprivation.[3] In England, higher antibiotic prescription levels have been linked to the Index of Multiple Deprivation and geographical location, with socioeconomic deprivation and prescription rates tending to be higher around major cities.[4] The rate of emergence of antimicrobial resistance is directly influenced by socioeconomic factors such as low education, slow economic growth, and insufficient awareness.[5] Specifically, income per capita is a recognised risk factor, with socioeconomically deprived sub-regions in the UK showing a positive correlation with antibiotic-resistant *Escherichia coli* prevalence.[6] Data from 15 European countries have shown similar trends, with rising income inequality being associated with higher rates of antimicrobial resistance in bacteria such as *Staphylococcus aureus, Klebsiella pneumoniae, Enterococcus faecalis*, and *E coli*.[7]

Charlotte Ho and colleagues also highlight the crucial role of socioeconomic indexes in antimicrobial resistance, noting that regions with poor access to clean water, sanitation facilities, and effective antibiotics account for more than 90% of antimicrobial resistance-related deaths.[1] Socioeconomic deprivation is a composite measure that considers several aspects of life, including low income, high unemployment, poor housing, and low levels of education. In England, the Index of Multiple Deprivation measures deprivation across seven domains: income, employment, education, health, crime, barriers to housing and services, and living environment. In addition to socioeconomic deprivation being associated with increased antibiotic use and self-medication, evidence shows that health-care providers are more inclined to prescribe antibiotics to people from socioeconomically deprived backgrounds due to concerns about complications, time constraints, and pressure from individuals.[5] A systematic review of 58 studies conducted in high-income countries showed that migrants turn to alternative sources for antibiotic supply when faced with health system barriers.[8]

Worldwide, acute illness in children is one of the most common reasons for seeking health care, and antibiotics are often unnecessarily prescribed for self-limiting conditions such as upper respiratory tract infections and mild diarrhoea. In addition to promoting antimicrobial resistance, unnecessary antibiotic exposure in children poses direct risks. Data from an unselected birth cohort of 12 422 children born at full-term suggested a substantial reduction in weight and height gain during the first 6 years of life in boys, but not in girls, following neonatal antibiotic exposure, after adjusting for potential confounders.[9] Additionally, neonatal antibiotic exposure has been associated with notable differences in the gut microbiome, particularly in reduced abundance and diversity of faecal *Bifidobacteria* until 2 years of age.[9]

Antibiotic use is influenced by various factors including the prescribing behaviours of clinicians and the knowledge, attitudes, and demands of individuals or caregivers.[10] Behaviour change interventions involving educational guidelines have shown promise in improving prescription practices. For example, in China, a randomised controlled trial in 35 rural primary health-care centres tested an intervention that included a desk guide, training, and prescription audits. The intervention resulted in a 29% absolute risk reduction in antibiotic prescriptions (95% CI –42 to –16; p=0·0002) for childhood upper respiratory tract infections.[10]

Antibiotic overuse remains the main modifiable driver of antimicrobial resistance. Efforts to control antimicrobial resistance should focus on addressing the underlying socioeconomic factors that contribute to higher antibiotic consumption in socioeconomically deprived areas and developing new antibiotics and surveillance systems.

Improving socioeconomic indexes by addressing poverty, unemployment, and access to health care and sanitation, especially in socioeconomically deprived neighbourhoods, might reduce antibiotic consumption and have a positive effect on antimicrobial resistance. These efforts should be complemented by targeted education on the risks of inappropriate antimicrobial use and strategies to promote rational prescription of antibiotics in socioeconomically deprived areas.

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1 Ho CS, Wong CTH, Aung TT, et al. Antimicrobial resistance: a concise update. *Lancet Microbe* 2025; **6:** 100947.
2 Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *Lancet* 2022; **399:** 629–55.
3 Cooper LN, Beauchamp AM, Ingle TA, et al. Socioeconomic disparities and the prevalence of antimicrobial resistance. *Clin Infect Dis* 2024; **79:** 1346–53.
4 McCloskey AP, Malabar L, McCabe PG, Gitsham A, Jarman I. Antibiotic prescribing trends in primary care 2014–2022. *Res Social Adm Pharm* 2023; **19:** 1193–201.
5 Garzon-Orjuela N, Vellinga A, Amin D, Oza A, Vellinga A. Trends and geographical variations in outpatient antimicrobial consumption in Ireland in relation to socio-economic deprivation. *Heliyon* 2024; **10:** e37563.
6 Alividza V, Mariano V, Ahmad R, et al. Investigating the impact of poverty on colonization and infection with drug-resistant organisms in humans: a systematic review. *Infect Dis Poverty* 2018; **7:** 76.
7 Kirby A, Herbert A. Correlations between income inequality and antimicrobial resistance. *PLoS One* 2013; **8:** e73115.
8 Harvey EJ, De Brún C, Casale E, Finistrella V, Ashiru-Oredope D. Influence of factors commonly known to be associated with health inequalities on antibiotic use in high-income countries: a systematic scoping review. *J Antimicrob Chemother* 2023; **78:** 861–70.
9 Duong QA, Pittet LF, Curtis N, Zimmermann P. Antibiotic exposure and adverse long-term health outcomes in children: a systematic review and meta-analysis. *J Infect* 2022; **85:** 213–300.
10 Wei X, Zhang Z, Walley JD, et al. Effect of a training and educational intervention for physicians and caregivers on antibiotic prescribing for upper respiratory tract infections in children at primary care facilities in rural China: a cluster-randomised controlled trial. *Lancet Glob Health* 2017; **5:** e1258–67.