Mitigating the effects of air pollution on cardiovascular diseases: community-based interventions for risk monitoring and communication

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More than 90% of the global population is exposed to air pollution levels exceeding recommended standards set by WHO.[1] High pollution levels are mainly attributed to growing construction works, industrial pollutants, motor vehicle traffic, landscape fires, and indoor air pollution. The impact of air pollution on cardiovascular diseases (CVDs) is a global public health concern.[2] However, current efforts for preventing CVDs are primarily focused on managing traditional or well-established cardiovascular risk factors (eg, high blood pressure), with little focus on air pollution, an emerging but common risk factor. Air pollution accounts for 15–20% of stroke-related deaths; therefore, mitigating the impact of air pollution is an important strategy to reduce cardiovascular deaths.[3]

The UN's Sustainable Development Goal 3.9 underscores the urgent need to reduce death and morbidity due to air pollution.[4] In 2021, the World Heart Federation, American College of Cardiology, American Heart Association, and European Society of Cardiology issued a joint opinion emphasising the importance of action at all levels, from individual to policy level.[5] However, current mitigation strategies largely target policy-level interventions. Although policy decisions are crucial in shaping the air quality standards and regulations, actionable individual-level and community-level measures (eg, tailored education on preventing and reducing air pollutants) are equally important, as emphasised by the World Heart Federation[6] and World Stroke Organization.[7] For example, primary

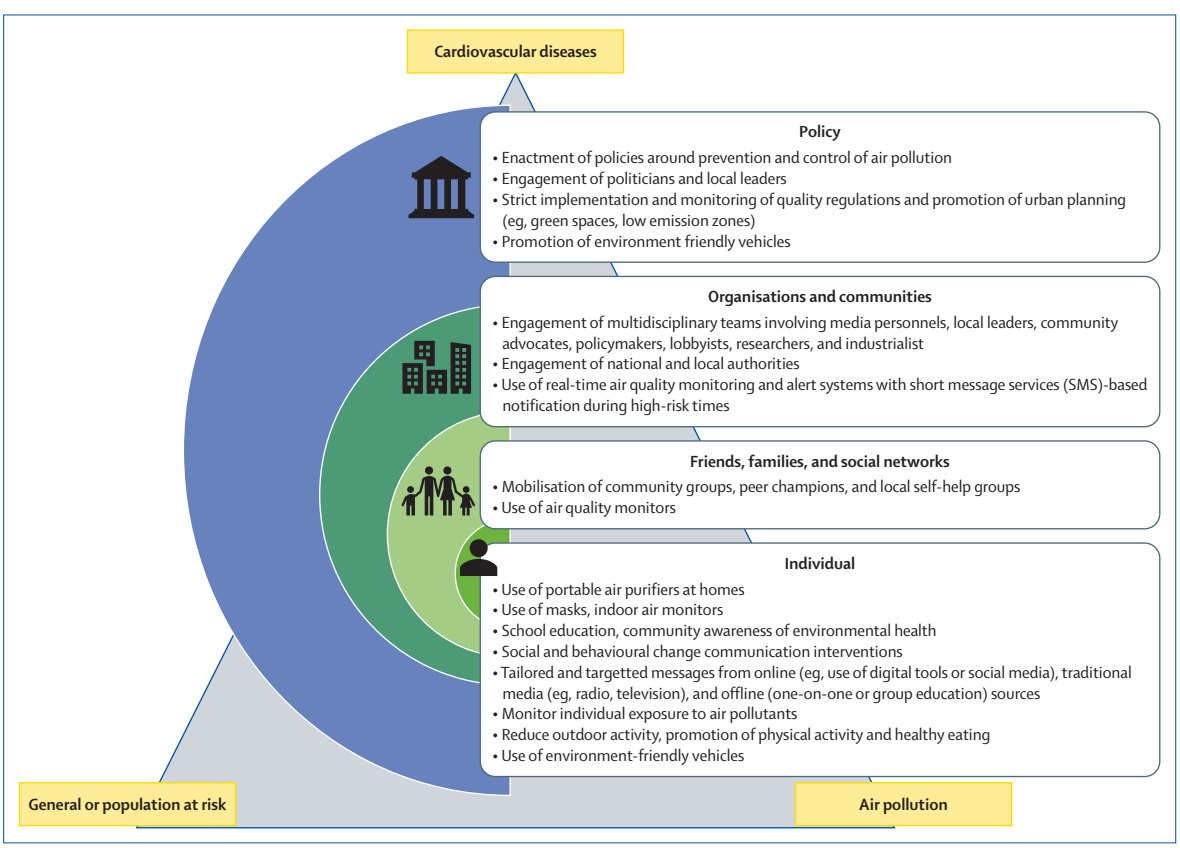


Figure: **Integrated multilevel strategies to mitigate the effects of air pollution for cardiovascular diseases prevention**

care providers are well placed to assess the level of exposure of individuals to air pollutants in the community, communicate the link to CVDs, and provide tailored risk-mitigating messaging or strategies. Similarly, community organisations have a key role in advocating for stringer air quality standards. These actionable measures should be integrated across individual, family, community, health-care, and policy levels both at national and sub-national levels.[8,9] Drawing our experience as researchers and practitioners with on-the-ground experience in implementing community-based interventions, we highlight the important but often underemphasised role of individuals, primary care systems, and community organisations in addressing air pollution—particularly for those most at risk. Our aim is to bring this perspective to a wider readership and advocate for more integrated, multilevel responses to environmental health challenges (figure).

Effective measures to reduce air pollution exposure at an individual level include using masks or air purifiers, avoiding being outdoors during high-pollution hours, avoiding open burning of waste or agricultural residue, maintaining personal vehicles, promoting use of electric vehicles, managing dust, and adhering to safe practices during construction. Individual-level wearable sensors are also important to monitor and reduce exposure to air pollution and inform prevention strategies.[10]

Primary care providers, being the first point of contact for health-care provision for many individuals, can effectively assess air pollutant exposure and communicate mitigation strategies. Some important strategies include the use of simple self-assessment (online or paper-based) checklists to assess exposure level and provide tailored education especially targeting older adults and those with pre-existing heart or lung conditions. Integrating risk communication into primary care guidelines could be an effective strategy to enhance awareness among people with pre-existing CVDs.

Community and civil society organisations have an important role in advocating for clean air, promoting healthy behaviours such as clean energy for cooking, monitoring construction sites, developing community parks, and urban planning. During the COVID-19 pandemic-related lockdowns, concentrations of particulate matter and most air pollutants decreased in many polluted cities in south Asia, signifying the role of individual and community actions. Community engagement is crucial in regulating construction sites, monitoring of vehicles, planning of industrial areas, and developing community parks. In many low-income and middle-income countries, $PM_{2.5}$ concentrations increased substantially, forcing governments to close schools temporarily. Civil society organisations and community groups called for broader efforts to improve air quality and protect children's right to a healthy environment, rather than focusing on extreme measures such as school closures or shifting to online education.[11] Therefore, community groups can act as catalysts in reinforcing regulations, planning industrial zones, especially away from schools, and providing air filters. Furthermore, community participation can support in preventing bushfires (eg, controlled burning, vegetation clearing, and local resource mobilisation).

These community-based interventions should be driven by national leadership and policy support. Both national and international policy framework for reducing the emission of nitrous oxide, sulphur dioxide, chlorofluorocarbon, and other pollutants is crucial in shaping air quality standards globally. Monitoring and enforcing stronger air quality standard should be inbuilt in each CVD guideline and across health and non-health settings. Policies should support the use of fuel-efficient vehicles, enforce environmental impact assessments and capacity building, and use of digital technology to monitor exposure at primary care settings.[10] Countries in south Asia and sub-Saharan Africa are already facing an air pollution crisis. Hence, urgent focus is needed on feasible community-based interventions to reduce CVD-related deaths and improve life expectancy.

We declare no competing interests.

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