Ambient Air Pollution and Child Development: Giving Urban Design and Planning More Emphasis in Global Guidelines

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Summary

Children are the future inhabitants of our world. In order for them to develop successfully, they must safely grow socially, mentally and physically. Unfortunately, the world's air pollution crisis is hindering this. Civilisations within urban environments are the worst affected, with industrial, agricultural, and transportational pollution proving the most detrimental to health and development. It is therefore particularly important to study how urban design and planning interventions can contribute to the improvement of global air quality. This policy brief presents an overview of the importance of the issue and communicates the key learning points from the global ARNEC (Asia-Pacific Regional Network for Early Childhood) Conference 2019, which focused this year on issues around climate change and their impact on young children. The paper provides recommendations for policy makers and relevant associations, explaining how the implementation of urban greening and increased sustainable public transportation can minimise air pollution.

Policy Implications

- Global policy and guidelines should provide distinct urban design and planning interventions and frameworks for improving air quality.

- Within the sector, frameworks for urban greening and public transportation should be a priority.

- Urban design and planning guidance must be highly integrated with guidance for climate change mitigation.

Background and Importance of the Issue

Air pollution is a threat to children around the world. In 2016 the WHO (World Health Organisation) reported that around 91% of the global population were living in places that exceed safe air quality recommendations (WHO, 2018). The result of this was 4.2 million premature deaths in 2016 alone, 600,000 of these were children (WHO, 2018). Deaths because of air

pollution are mainly caused by acute lower respiratory infections, of which children are at greater risk. This is due to children breathing at a faster rate than adults, thus exchanging with a larger proportion of polluted air. Moreover, their developing bodies are more easily damaged by the toxins in the air. The brain is at risk to impaired cognitive development, which affects memory, social interaction and welfare. Particulate buildups put the rest of the body at greater risk to certain diseases later in life, including; Stroke, Pneumonia, Ischemic heart disease, Chronic obstructive pulmonary disease and Lung cancer. (Dora, 2019)

As if the severe health risks as a result of breathing in polluted air are not concerning enough, air quality is getting worse. Air pollutant emissions have risen as a consequence of the planet's highest ever economic and industrial activity. The 2016 version of the WHO ambient air quality database study, analysed 3000 global cities. It provides an assessment of air quality levels, and how these have changed in recent years. It estimates that globally, annual particulate matter in the air has increased by 8% during a recent five-year period (WHO, 2016, p29). This increase must be reversed, and the known urban solutions for air quality improvement must be implemented into global policy. If not, the health consequences will only continue to be heightened.

As air pollution is increasing, so is climate change. When fossil fuels are used, pollutants such as carbon dioxide, carbon monoxide, methane, nitrogen oxides, particulate matter and sulphur dioxide enter the air. Not only are these responsible for air pollution, they are responsible for climate change, with carbon dioxide and methane being the biggest contributors. Climate change brings its own threats, such as adverse weather conditions leading to natural disasters. If a better livelihood for children is to be achieved, an entirely clean energy sector must be planned for. Furthermore, international cooperation and action over air pollution and climate change should be highly integrated.

Review of Existing WHO Air Quality Guidelines

In order to establish recommendations for the future, and improve air quality, it is important to review any relevant existing guidance. The string of existing WHO (World Health Organisation) AQGs (Air Quality Guidelines) have been formulated from a thorough and extensive evaluation of scientifically sourced evidence. As the WHO AQGs set standards for a global platform, a heterogeneous strategy is used. The guidelines consider factors such as, technological feasibility, economic evolution and political circumstances from

a worldwide perspective. Decision makers use the AQGs to assist in setting goals and formulating or amending policy for air quality management. Resultantly, these guidelines are largely followed by associations worldwide, and are a good resource to draw upon. (WHO, 2015)

The summary from the 'WHO Expert Consultation: Available evidence for the future update of the WHO Global Air Quality Guidelines', concluded that previous versions of the AQGs have been very successful in providing pollutant exposure specific guidance. This is mostly given as 'not to be exceeded' recommendations. It was noted that to expand upon this, the WHO could apply the guidelines directly to policy making, with an insight to how the guidelines may be fulfilled. (WHO, 2015, p25)

For future updates of the AQGs, it could be conceivable to include distinct interventions and frameworks which respond to meeting the 'not to be exceeded' air quality guidance for children. This could come in the form of urban design and planning strategies to both lesser the effects of air pollution, and prevent its cause. Such strategies could help policy makers and stakeholders worldwide to improve air quality. However, it is important to note (?) that any guidance remains proven effective by evaluated scientific evidence.

Learning Points from the Global ARNEC Conference 2019

The Global ARNEC (Asia-Pacific Regional Network for Early Childhood) Conference 2019, brought educators, researchers, government officials, and professionals together from over 30 countries. The conference theme explored the process of improving early childhood development programmes. As part of this, air quality management within the context of the built environment, and climate change was discussed. This provided a key opportunity to learn about urban design and planning strategies, which progress towards meeting AQGs. The findings can be categorised into two themes, strategies to lesser the effects of air pollution, and strategies to prevent its cause.

Strategies to Lesser the Effects of Air Pollution:

In his keynote presentation, Dr Dora, a health policy expert and former coordinator for the WHO, stated that an obvious way to minimise children's exposure to toxic particulate matter, is to reroute school pathways (pedestrian routes children may take to school). Such routes can be designed and implemented to circulate through streets with lower traffic flow, and better air quality. In addition, pathing may be designed further away from the road, to

lessen children's direct exposure to road traffic emissions. (Dora, 2019)

Another intervention, discussed during the conference, was urban greening. This involves designing green infrastructure (plants) into the urban environment. As plants respire, they absorb some of the harmful pollutants from the air. Studies have found that vertical green structures have the potential to reduce particulate matter and nitrogen dioxide levels by 40% and 60% respectively (Appuhamillage, 2018). Moreover, presenter Caroline Essame, founder and CEO of CreateCATT, emphasised how urban greening is one of the most effective low cost solutions to tackle air pollution (Essame, 2019).

Strategies to Prevent Air Pollution:

Rethinking transportation is one of the most efficient ways society can improve air quality, at least from a ground level perspective. Dr Dora shared some of what he has learnt in regards to sustainable transportation and its effects. He stated that there is a need for future policy to put more emphasis on intensive public transport, as although electric cars and motorbikes produce zero toxic emissions, they still create congestion and vehicular dominated cities. Studies have shown that electric buses, trams and cycling allow for more liveable and sustainable places. They increase physical activity, reduce traffic

injuries, reduce noise pollution, and promote social cohesion. (Dora, 2019)

Transportational infrastructure, such as the above, also contributes towards creating densified urban landscapes. In the IPCC's (International Panel on Climate Change) 2014 report on climate change mitigation, densifying urban landscapes is a strategy that should be implemented to reduce the emissions responsible for climate change and air pollution (IPCC, 2014, p603). Urban densification involves bringing housing, services, industry, agriculture and green space closer together with a sustainable drive. Subsequently, densification creates lower energy needs per person, and reduces pollutant emissions.

Recommendation for Future Guidelines and Policy

Urban design and planning has a vital role to play in reducing and minimising the effects of air pollution. The future guidelines and policies for this sector should provide scientifically tested frameworks, of which can be implemented by establishments worldwide. In particular, it is recommended that frameworks for urban greening and public transportation are a priority.

Urban Greening:

Global policy should consider how green solutions, such as street trees, vegetation barriers, green walls, green roofs, and nature based sustainable drainage, can be a legal requirement for urban designers and city planners to incorporate within schemes. As some solutions are more applicable to new developments, policies should set guidelines for regeneration and proposed projects in separation, with due attention to both. Where resources are few, policies should focus action in and around school areas, with the overarching objective to improve air quality for children. In less developed countries, emphasis on low cost approaches to these solutions may be appropriate.

Public Transportation:

It is recommended that sustainable public transport networks have a priority position at an urban planning level. This may be achieved through the initiation of municipal transport assessments to ensure that planning applications can be reviewed and assessed for their specific impacts, and for their compatibility within the given urban context (GLA, 2017).

Any development proposals should reflect and integrate with current and planned transport access, capacity and connectivity. To ensure a holistic, multi-sector result is achieved, policies should

coordinate vigorously with IPCC guidelines.

Concluding Remarks

In conclusion, if the global air pollution crisis is to be reversed, and a safer environment for children is to be realised, urban design and planning sectors must prioritise the issue. Without action, communities around the world will progressively be affected by insufficient air quality, studies by the WHO (World Health Organisation) have proved this. However, studies have also shown that there are achievable solutions to prevent and minimise air pollution. The implementation of urban greening and an increase in sustainable public transportation can be achieved by municipal guidance and policy. Moreover, scientific research by organisations such as the WHO and the IPCC is greater than ever. Through multi-sector action, the coming years should give society the knowledge and the evidence needed to save our planet.

COVID-19

Since the global ARNEC conference in December 2019 and the completion of this policy brief, Coronavirus has vastly changed the way we live our lives. It has put tremendous strain on much of the public sector and influenced both short term and long term global policy making.

As a result, some of the resources that were previously available for urban design and planning have been spent or adapted for the pandemic. Despite this, the policy implications outlined in this policy brief still apply. Climate change and global air quality continue to threaten the social, mental and physical development of children around the world.

References

The World Health Organization. (2018a). World Health Organization Fact Sheet [online]. Available from: https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health [Accessed 23 December 2019].

Dora, C. (2019). Presentation: Environmental Threats Affecting Young Children's Health and Development: The Role of Policies and Partnerships. ARNEC Conference held in Hanoi, Vietnam, 4-6th December 2019.

The World Health Organization. (2016). Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease. [online]. Available from: https://apps.who.int/iris/bitstream/handle/10665/250141/9789241511353-eng.pdf?sequence=1 [Accessed 23 December 2019].

The World Health Organization. (2015). WHO Expert Consultation: Available evidence for the future update of the WHO Global Air Quality Guidelines (AQGs). [online]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0013/301720/Evidence-future-update-AQGs-mtg-report-Bonn-sept-oct-15.pdf?ua=1 [Accessed 26 December 2019].

Appuhamillage, U. (2018). The Impact of Green Walls in the Reduction of Atmospheric Particulate Matter Pollution. Unpublished PhD thesis, Department of Philosophy, Staffordshire University.

Essame, C. (2019). Presentation: Nature and the Brain - How Urbanisation and Technology is Impacting Childhood Development. ARNEC Conference held in Hanoi, Vietnam, 4-6th December 2019.

The International Panel on Climate Change. (2014). Climate Change 2014: Mitigation of Climate Change. [online]. Available from: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf [Accessed 28 December 2019].

Greater London Authority. (2017). Policy T4 Assessing and mitigating transport impacts. [online]. Available from: https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-

plan/draft-new-london-plan/chapter-10-transport/policy-t4-assessing-and-mitigating-transport