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Healthy Environments for Healthy Children

Environmental determinants of vector-borne diseases in children

Executive summary

Vector-borne diseases are transmitted to humans through agents such as mosquitoes, ticks or flies. Pathogens that cause vector-borne diseases can be viral, bacterial or parasitic. The frequency of disease transmission, the severity of disease outbreaks, and other epidemiologic variables are influenced by the environment. These include changing meteorological variables from climate change influencing how pathogens are transmitted, changes in animal hosts and viability, and the ways humans interact with their built and surrounding environments.

Other environmental factors include population mobility, deforestation, pollution and habitat fragmentation, largely driven by global urbanization. These contribute to declining biodiversity, which also has an impact on disease transmission and health outcomes. Vector-borne diseases have outsized impacts on maternal and child health, leading to higher morbidity and mortality and a reduction in the quality of life.

Data gaps exist for many vector-borne diseases and how they impact health, even in areas where they are common. This underlies the strong need for improved surveillance and public health infrastructure so that more effective and sustainable solutions can be identified and implemented. International communities are identifying, responding to, and recovering from vector-borne disease outbreaks, and considering how their local disease burdens are changing from environmental factors.

The best solutions take an all-of-government approach and emphasize child health considerations to improve their effectiveness and sustainability. Attention to urban planning and the built environment, health care system infrastructure, public health surveillance and monitoring, emerging pathogen resistance to medications, and emerging vector resistance to insecticides is important. Low-cost community investments that support health and vector control focus more on structural and ecological solutions and have the added benefit of reducing toxic impacts from chemicals on child health and the natural world.

Box 1. Dengue fever and mosquito control in South America

In 2024, a woman in her early twenties travelled from the remote central Peruvian jungle to the Santa Rosa Hospital in Lima, Peru. After presenting with a high fever and severe abdominal pain, she was found to have internal bleeding. Her medical team was concerned that this was a pregnancy-related complication, but after a full evaluation, she was diagnosed with severe dengue fever. It was the beginning of a dengue fever epidemic in Lima. The hospital, which saw 13 patients with dengue fever in 2022, began seeing 40–60 patients per day with this vector-borne disease (Teirstein, 2026).

Aedes aegypti mosquitoes are major vectors for dengue fever, zika fever, yellow fever and chikungunya fever globally. They are common around developed areas, especially in urban settings, and lay their eggs in open water storage containers, flower pots and discarded plastics. In the weeks before the epidemic, unusually intense rains flooded the city, which likely increased breeding sites. Hotter and wetter global weather conditions, which are becoming more frequent around the world because of climate change, boost the development of mosquitoes as well as the replication of the dengue virus inside mosquito hosts. In 21 countries across Asia and the Americas, an estimated 18 per cent of dengue cases between 1995 and 2014 would not have occurred in the absence of climate change (Childs et al., 2025).

South American communities are responding to the increased risk of mosquito-borne disease. Public health departments are using machine learning to predict outbreaks months in advance, allowing them to move resources to areas where they will be in high demand and also enabling local municipalities to alert residents to stay indoors and to wear insect repellent when outside. Newer technology is also being deployed. In Brazil, public health authorities are releasing mosquitoes infected with *Wolbachia* bacteria, which prevent dengue from replicating inside mosquitoes. These *Wolbachia* mosquitoes were released in the city of Niterói, Brazil between 2017–2023, and the city has seen a 90 per cent decrease in dengue caseloads following these releases. An estimated 75 per cent of the dengue case burden expected in the 2024 epidemic was prevented through this vector control method (Anders et al., 2025; Teirstein, 2026).

Introduction

Vector-borne diseases (VBDs) occur when certain pathogens (viruses, bacteria, and parasites) enter the human body through an agent, a living organism that transmits pathogens between humans and/or animals. See Table 1 for an overview of the most common vectors and vector-borne diseases.

Table 1. Examples of vector-borne diseases

Vector	Vector-borne disease
Mosquitoes (various species)	Chikungunya, dengue, Japanese encephalitis, lymphatic filariasis, malaria, yellow fever, zika, Rift Valley fever, West Nile fever
Triatomines (kissing bugs)	Chagas disease
Ticks	Borreliosis, babesiosis, Lyme disease, Crimean-Congo haemorrhagic fever, tick-borne encephalitis, typhus
Snails	Schistosomiasis
Sandflies	Leishmaniases (cutaneous, mucocutaneous, visceral, post-kala-azar dermal leishmaniasis)
Mites and lice	Rickettsialpox, typhus, plague
Flies (various species)	Onchocerciasis, human African trypanosomiasis (sleeping sickness)
Fleas (various species)	Plague, cat-scratch disease, murine typhus

Source: WHO, 2024

Some **80 per cent of the global human population is at risk of one or more VBDs** and 17 per cent of the global burden of communicable diseases are due to vector-borne illness.

More than 700,000 deaths are caused by VBDs annually, and the burden is highest in tropical and subtropical regions of the globe (WHO, 2024). Women and children bear the highest VBD burden, especially those experiencing severe poverty in low- and middle-income countries (LMICs). Many VBDs can be transmitted during pregnancy to a fetus if the mother is infected, resulting in major health implications for the mother-infant dyad,[1] such as with zika virus (Freitas et al., 2020). Contracting chikungunya virus during pregnancy can cause spontaneous abortions, and infants who contract the virus after birth have a higher rate of neurological and heart disease complications (Naik et al., 2025).

VBDs are a growing global public health priority. The interactions between vectors and the pathogens that they carry, human hosts, and other animal hosts are dynamic and complex. Many VBDs have yet to receive the significant investment needed to develop improved surveillance, therapeutic and diagnostic tools for adults, let alone focus on paediatric populations. Given these complexities, the public health response must also be dynamic and consider the growing understanding of environmental contributions. Without this understanding, it will be difficult for communities to successfully meet their vector-borne disease goals, resulting in some prioritizing control, while others may set a goal of elimination or eradication.

1 The close, interconnected biological, emotional, and psychological relationship between a mother and her infant.

Burden of disease

For many VBDs, child-specific epidemiological data is incomplete or non-existent, even in areas of endemicity. For example, spotted fever, a tick-borne illness group, is thought to be greatly underdiagnosed and under-reported throughout the western hemisphere, yet the highest case-fatality rate is observed in those less than 10 years of age. The following subsections highlight existing child-specific epidemiological data for selected VBDs.

Leishmaniasis

Leishmaniasis affects roughly 5 million people; cutaneous visceral, and post-kala-azar dermal leishmaniasis (PKDL) is endemic in 71 countries. Young children are vulnerable due to immature immune systems and a lack of previous exposure. More than 30 per cent of cases occur in individuals under 20 years old, and leishmaniasis is the second leading parasitic cause of death (after malaria) in children under 5 years of age, accounting for an estimated 3,338 paediatric deaths and 382,634 disability-adjusted life years (DALYs) in 2019 (Carbone et al., 2025). PKDL can occur as chronic sequela of visceral leishmaniasis, mainly in East Africa and on the Indian subcontinent, in about 5–15 per cent of cases after a 2–3 year interval, with equal distribution between children and adults (WHO, 2013).

Chagas disease

Chagas disease, largely focalized in Latin America, is under-reported outside of endemic regions as it is underrecognized and underdiagnosed. Crucially, in non-endemic countries, the predominant route of infection is maternal-fetal transmission (4.7 per cent) which can have significant impacts – child and family health, economic and social – across the child's lifespan (Carbone et al., 2025). Complications include premature birth and anaemia, and untreated infants are at risk of developing chronic heart disease.

Tick-borne relapsing fever

Relapsing fevers spread by lice tend to occur in epidemics associated with war, poverty, famine and poor personal hygiene, and remain endemic in parts of East Africa. Tick-borne relapsing fevers have been reported from all continents except Australia and Antarctica. Despite poor data that may lead to underestimation, in Western Africa, tick-borne relapsing fevers account for roughly 12 per cent of febrile illnesses and in East Africa, tick-borne relapsing fevers are a disease with high childhood mortality (Jakab et al., 2022). Pregnant women and their newborns are at increased risk for tick-borne recurrent fever-associated complications including severe respiratory distress and premature delivery. Neonates have a 1 in 3 case mortality rate.

Scrub typhus

There are at least 1 million infections of scrub typhus every year, mostly in Asia, where it is a leading cause of treatable non-malarial febrile illness (Bonell et al., 2017; Wang et al., 2024). Complications in children include serious lung and brain infections that can cause significant disability. Epidemic typhus is seen especially during times of poor sanitation from crowding, war, famine, extreme poverty and civil strife.

Japanese encephalitis

Japanese encephalitis is primarily an illness of childhood due to nearly universal exposure in adolescence through adulthood in endemic areas. Case fatality rates can reach 30 per cent, especially in children (Roberts and Gandhi, 2020). Complications are directly related to a patient's age and the severity of the disease, and are most common in patients 10 years or younger. They include mental deterioration, severe emotional instability, personality changes, motor abnormalities and speech disturbances.

Zika virus

Residents of urban areas, particularly in areas without water and waste infrastructure, overcrowding, and frequent population movements are at high risk of contracting zika virus (Rabe et al., 2025). Between 2015–2017, the epidemic in North, Central and South America highlighted the risk of VBDs to children through congenital zika syndrome, including congenital abnormalities and lifelong neurological impacts. The earlier in pregnancy that zika infections occur, the greater the likelihood of severe congenital zika syndrome (Freitas et al., 2020). Reported acute mortality rates among live-born infants range from 4–6 per cent.

Schistosomiasis

More than 700 million people, primarily children and young adults, are at risk for schistosomiasis, and it is the second most disabling parasitic disease after malaria. Prevalence increases with higher population density, and new irrigation projects provide broader habitats for intermediate snail hosts. Transmission depends on water contamination by human waste, the presence of snail hosts, and the social patterns of water usage in the population. Exposure to infected water starts early as passive water contact by infants (accompanying their mothers in their daily household activities) evolves to more water contact as older children wade and swim. Measurements of the intensity of infection demonstrate that the heaviest worm loads are found in school-age and adolescent children. Untreated schistosomiasis can lead to long-term complications, including female and male genital schistosomiasis. Female genital schistosomiasis may affect at least 40 million women and girls in Africa and can lead to severe reproductive health complications including infertility, ectopic pregnancies and miscarriage (Bowers et al., 2025).

Unique vulnerabilities of childhood

Children are uniquely vulnerable to VBDs compared to other age groups for several reasons. Infants and younger children have developing immune systems that may result in less capable immune defence when vector-borne infections occur (UNICEF, 2020). Certain behaviours of childhood, such as hand-to-mouth activities for many items found in their environments, scratching and crawling on the ground, and variable adherence to handwashing, provide greater opportunities to introduce VBD or secondary infections compared to adults who can better restrain themselves from scratching. Young children are less able to communicate specific symptoms when ill and are reliant on caregivers to identify disease manifestations that can delay diagnosis and treatment. Children are also reliant on caregivers for food and housing security which, when absent, can contribute to infection rates and serious side effects. Children are more likely than adults to spend more time outdoors, especially in agriculture or animal husbandry environments that put them in closer contact with animals, and close to water bodies such as irrigation channels, rivers and lakes where vector breeding habitats can be more frequently encountered (Carbone et al., 2025).

Environmental risk factors

There is growing evidence of environmental influences on VBDs that intersect with the specific vulnerabilities of infancy, childhood and adolescence. Children interact with the built environment and domestic or wild animals and insects in their homes differently than adults. Important variables in the built environment include:

- Access to clean water, air and soil
- Adequate sanitation infrastructure
- Housing quality
- Access to green or blue space

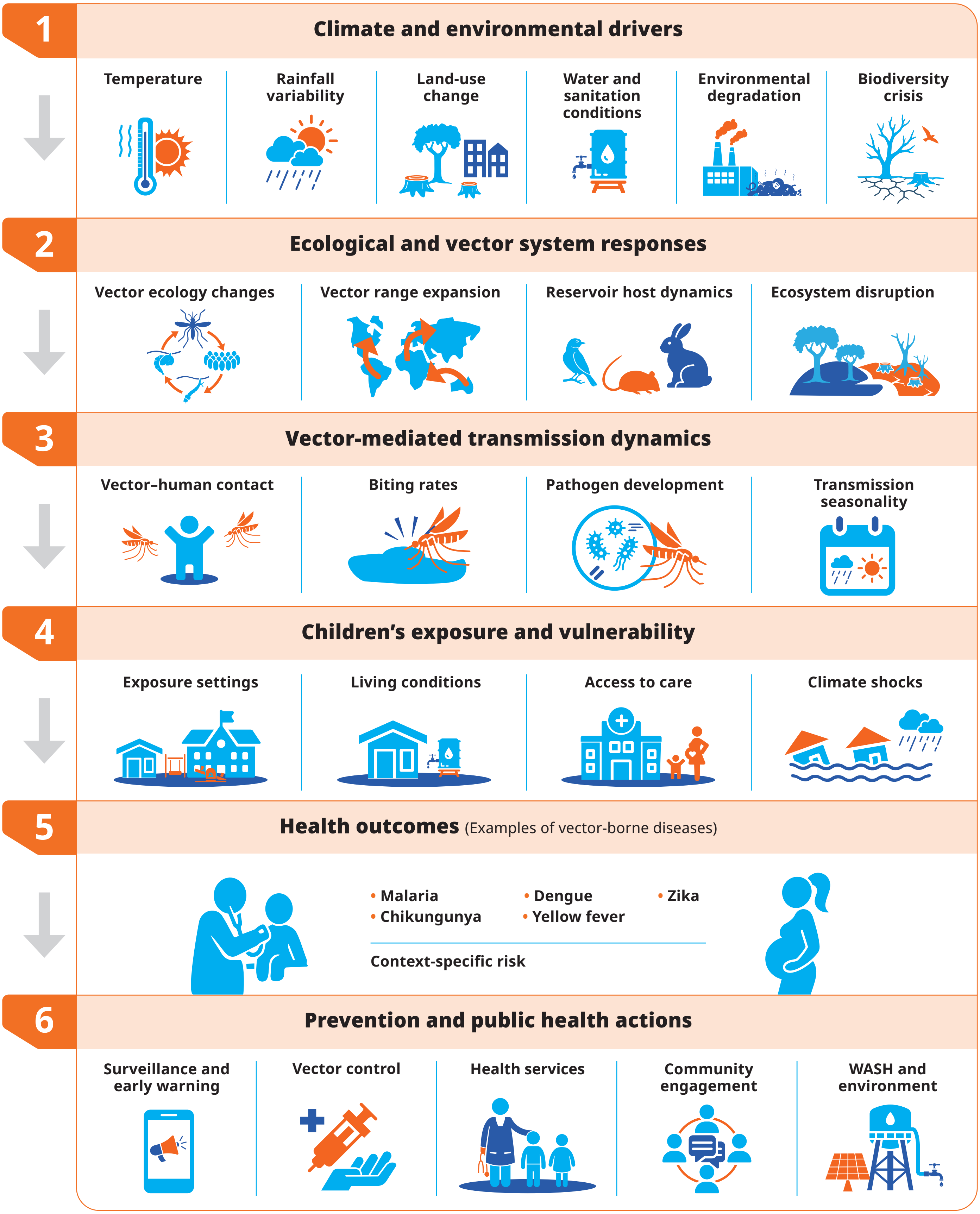
Urbanization and design decisions have important impacts that can link to other environmental factors like deforestation and habitat fragmentation. Underlying these variables are major evolving environmental issues:

- Impacts of climate change on human and animal behaviour
- Declining global biodiversity
- Rising rates of insecticide resistance
- Rising rates of drug resistance

The multiple interacting effects of warming temperatures on vectors and pathogens, together with changes in host behaviour, make advanced mathematical modelling an important tool for understanding the net effects of climate change on VBD transmission. The effects of temperature, precipitation and humidity are best characterized for their impacts on VBD transmission (see Figure 1) but other meteorologic and climactic variables likely have intersecting and understudied impacts. Displaced human populations increase the risk that immunologically naïve people will encounter new exposures in new locations. Climate migrants are vulnerable to infections if they suffer from malnutrition as it can weaken immune systems. Africa has seen extensive increases in flooding, which causes displacement and related risks including disrupting human hygiene practices, destruction of essential infrastructure including health and WASH facilities to maintain public health and create new breeding sites in stagnant water for VBD hosts (Africa Center for Strategic Studies, 2024).

Figure 1 shows the complex and variable environmental factors that affect vector-borne disease pathogens, vectors, hosts and humans, as well as recommending responses.

Figure 1. **Climate, environmental change and vector-borne disease risks for children**



Changing temperatures influence rates of vector development, reproduction, length of life and behavioural patterns and can have varying impacts depending on the vector species. For example, dengue virus is transmitted to humans through the bites of infected female mosquitoes, primarily *Aedes aegypti.* When a mosquito bites a dengue-infected host, the virus must travel to the midgut and replicate before infiltrating other mosquito tissues, including the salivary glands, which allow the mosquito to transmit the virus when it bites again. This extrinsic incubation period varies based on temperature. It takes roughly 8–12 days when the ambient environmental temperature averages between 25 and 28°C, with higher temperatures typically accelerating mosquito development and viral replication (WHO, 2025). However, at extremely high temperatures, adult mosquitoes' survival may be reduced in certain regions; a combination of high temperatures and prolonged droughts may further reduce mosquito populations through the lack of breeding sites that are required for larval development (Houatthongkham et al., 2026).

Diurnal temperature range (the difference between the high and low temperatures each day) can also modify mosquito survival and vector competence (Houatthongkham et al., 2026). When combining these temperature considerations alongside relative humidity, wind patterns, changing large-scale climate phenomena like the El Niño–Southern Oscillation (ENSO) and accounting for regional heterogeneity, the need for complex modelling becomes apparent. Each vector, pathogen and host species has a unique and variable response to each of these environmental variables, which are also influenced by regional geographic and built environment differences.

Global biodiversity loss has cascading impacts on VBDs. Species that co-occur or live in ecosystems with the primary pathogen reservoir can change the abundance and transmission rate of pathogens. The composition of the host vector's ecosystem including predator/prey interactions can change a pathogen's abundance and transmission potential but remains understudied and is a major area for future work in vector control. The primary drivers of native species' loss and declining biodiversity are habitat destruction, fragmentation, direct exploitation, pollution, displacement by non-native species including the introduction of non-native pathogens, and climate change.

In general, larger species with a slower pace of life, more specific or niche habitats and dietary needs (such as apex predators with diets heavily weighted towards specific types of animal prey) are more sensitive to habitat loss or fragmentation (Marcolin et al., 2024). In vertebrates, rodents and songbirds tend to persist and proliferate in urbanized, suburbanized, or agricultural settings while other species disappear (Keesing and Ostfeld, 2021). Rodents especially can act as pathogen reservoirs, increasing the risk of transmission of pathogens between reservoirs and vectors, in turn raising the transmission risk of vector-borne diseases. Small mammals that are synanthropic (regularly occupy human dwellings) or that increase in number because of anthropogenic disturbances, are often the most competent natural reservoirs for many zoonotic diseases worldwide. For example, the black rat *(Rattus rattus)* acts as a reservoir host for plague *(Yersinia pestis)*, and when they live synanthropically, fleas can more easily transmit the pathogen from the reservoir to humans, resulting in bubonic plague. Recent plague outbreaks in the Democratic Republic of the Congo have been linked to climate change, increased rates of migration and poverty, emphasizing the links between these variables (Carter and Moncrieff, 2021).

In the Americas, the abundance of reservoir species (rodents and small marsupials) and kissing bug vectors for Chagas disease have increased when larger mammalian diversity is reduced. Small forest patches from habitat fragmentation host higher densities of ticks harbouring Lyme disease (Keesing and Ostfeld, 2021). The interactions between different species in each environment and their impacts on pathogen reservoirs and transmission from declining biodiversity are understudied but research is expanding.

Changes in land-use can affect VBD patterns through changes in the abundance, distribution and behaviour of species involved in maintaining and transmitting pathogens. For example, the construction of dams and irrigation canals in some tropical environments allows for the proliferation of snails that are essential intermediate hosts for the parasites that cause schistosomiasis. However, the conversion of natural wetlands to agricultural fields can reduce pathogen transmission by reducing breeding habitats for mosquitoes (Marcolin et al., 2024). The net effect of land-use conversion depends on how it affects local species capable of amplifying or diluting pathogen transmission and on changing human behaviour patterns in these environments.

Disease patterns can be altered through human behaviour change. Logging and deforestation can increase malaria transmission by both attracting human populations to high-exposure areas and by altering local ecologic conditions, including the creation of favourable breeding sites and changes in vector species composition. Urbanization can reduce exposure to some high-risk vector-pathogen habitations such as in forest settings, but it may also increase the risk of urban VBDs in areas with high population density and inadequate public health infrastructure. Urbanization can also have an impact by increasing rural to urban migration and lead to more people living in areas with poor infrastructure that are conducive to VBD transmission. How communities have access to and interact with their local green (park, forest, farmland, schoolyard) and blue (irrigation, rivers, lakes, ocean) spaces can result in important exposure pathways that lead to VBD transmission without public health intervention measures.

Pollution can have important impacts on VBD. Nitrogen and phosphorus from agricultural run-off enter waterbodies and can increase pathogen transmission when these compounds elicit population growth in specific vector, host or parasitic species. Insecticides (used agriculturally or for indoor residual spraying) may cause sublethal effects in a vector or host that increase parasite or pathogen resistance without reducing vector or host abundance and lead to increased insecticide resistance. For example, in Belize, malaria parasites are transmitted to humans predominantly by two different *Anopheles* mosquito species. One species is much better at biting humans and has been implicated in more malaria cases. Both species breed in marshes and wetlands but segregate based on the types of vegetation that dominate. One species *(A. vestitipennis)* is more abundant in marshes with tall wetland plants and in flooded forests, while the other species (*A. albimanus*) breeds more favourably on shorter plants. Agricultural run-off benefits taller plants and improves habitat for the species that is more competent for spreading malaria to humans (Grieco et al., 2007).

Other types of pollution also have important VBD transmission through their impacts on vector habitats. Discarded plastics and other human refuse in built environments can serve as water collection devices where mosquitoes can easily breed and lay eggs. *Culex* and *Aedes* mosquitoes prefer standing water for breeding habitats and are important vectors for a variety of VBDs (Table 1) such as dengue and West Nile virus that pose risk in urban environments where generally plastic pollution is found close to human living spaces. In addition, in climates that are affected by chronic droughts, human populations often adapt water harvesting and storage practices into water containers that may be left open to the air and can also contribute to increased transmission risk if not covered or maintained properly.

Insecticides, part of the pesticide family of chemicals, are commonly used as part of vector control methods and are also environmental pollutants that have harmful chronic effects on child health (Brown et al., 2018). Children can experience acute poisoning through unintentional ingestion of improperly stored products or if insecticides are improperly applied in household or community settings (UNICEF, 2026).

Box 2. Schistosomiasis and Lake Malawi

Roughly 94 per cent of schoolchildren who live around Lake Malawi are infected with *Schistosoma* flukes that cause schistosomiasis. The abundance of schistosomes correlates with *Bulinus* snails, their intermediate hosts. The number of these snails has increased dramatically in Lake Malawi in recent decades accompanied by a commensurate increase in schistosomiasis in the human population. Snail abundance is associated with overfishing of snail-eating fish species and local agricultural run-off and sedimentation in the lake. Intensifying agriculture around Lake Malawi also appears to intensify the transmission of schistosomiasis to local populations and the warming trend of lake water from climate change has increased the reproductive rate of the schistosomes in multiple stages of their life cycle.

Human activity around Lake Malawi is changing in response. Local communities, in partnership with researchers, have introduced a native freshwater prawn into Lake Malawi that successfully preys on snail hosts for schistosomes and reduces human transmission. Combining traditional vector control methods with smart freshwater ecosystem management helps to maintain healthy native predator populations, reducing local disease burden. An added benefit includes providing a local, sustainable, high quality food source for local communities.

UNICEF leads an initiative to develop the Global Child Hazard Database, which provides comprehensive, high-resolution, and globally standardized datasets on children's exposure to multiple hazards (UNICEF, 2026). The database aims to improve accessibility and provide actionable insights for key stakeholders, thereby supporting informed decision-making and policy advocacy. The database compiles a wide range of hazard data, primarily focusing on climate and environmental indicators, but also including geophysical hazards and conflict. The data is collected at the highest resolution available to provide a detailed picture of risks at the sub-national level. The database includes information on vector-borne diseases (e.g., malaria).

Policy recommendations

Some VBDs are likely to worsen while others may decline in transmission, incidence or geographic distribution depending on local conditions that influence transmission, vector habitats and human behaviour patterns. In this context, local communities that identify local issues and identify relevant solutions that do not need sustained funding sources stand the best chance of success. Community investments in public health surveillance and alert systems, health education, climate change mitigation and adaptation measures, poverty reduction, and improving water, sanitation and hygiene infrastructure will be money well spent. Essential investments in VBD-specific public health infrastructure include better surveillance of pathogen resistance to medications, vector resistance to insecticides, changes in vector transmission, and human behaviour change.

VBD control and preventive measures can be improved by including environmental health personnel in housing development and urban planning projects. Their expertise on integrating smart ecology practices will help mitigate deforestation and biodiversity loss, improve access to green and blue spaces, and improve water, sanitation and hygiene infrastructure. Simple building modifications such as installing screens to doors, windows, eaves and porches and making sure that gaps in walls, doors and windows are filled are also excellent options that deter pests. Another option includes installing eave tubes, fitted with electrostatic mesh inserts treated with insecticides, into exterior walls. Although there may be local constraints to implementing structural housing solutions, which can have relatively high up-front costs, they have been shown in sub-Saharan Africa to reduce malaria parasite prevalence by 32 per cent and anaemia by 30 per cent, and the price is comparable to other malaria control interventions (Snyman et al., 2025). Community waste management practices that prioritize cleaning up environmental litter to remove potential water reservoirs and reduce mosquito breeding habitats. Climate mitigation practices (such as methods to reduce heat islands or building bioswales to address flooding) also can implement smart ecology practices so that they don't introduce opportunities for VBD transmission.

Further research on the variables that influence VBDs is important. However, these findings must be interpreted at local level, in order to achieve high quality programmatic planning, community engagement, and greater control of VBD. In the short term, improving programme implementation and accessibility for vulnerable populations is essential. In the medium term, new vaccine development such as for malaria and dengue fever, and other forms of biological control technology (*Wolbachia* mosquitoes, gene editing of vectors) are being explored to better protect populations from emerging resistance and the changing epidemiology of disease. Long-term innovation through ecological models that support biodiversity are likely the most sustainable and cost-effective methods for VBD control, but suitability depends on the specific pathogen, vector and environmental variables for that locale. Ecological control methods also help prevent further insecticide resistance, when required, as a last resort.

Health education can emphasize connections between VBDs and climate change, urbanization, deforestation and the biodiversity crisis. Communities are often the best sources for long-term, sustainable solutions. In both the South American and Lake Malawi regions, the success of the highlighted solutions relied heavily on community education, centred on VBD variables, how the solutions work and how they would be implemented locally. A Bangladeshi organization, created in 2016 by Dhaka residents, has recruited more than 50,000 volunteers who fan out across the country on a weekly basis to clean environmental litter from their neighbourhoods. This eliminates mosquito breeding sites to reduce dengue and chikungunya VBD transmission. Other locally organized Bangladeshi ideas to address VBD concerns include an artificial intelligence early warning system, and releasing sterilized mosquitoes to reduce the population. The country's health ministry is also working with other ministries to institute education programmes in schools on ways to prevent VBD transmission (Beato, 2026).

Table 2. **Policy recommendations**

Theme	Recommendation
Management and reporting	• Invest in local and regional public health system infrastructure to build resilience and capacity to respond to VBD outbreaks through improvements to vector and pathogen surveillance and monitoring systems, especially beyond mosquitoes. • Identify high impact opportunities to integrate artificial intelligence into systems to improve forecasting, reporting, communications and overall efficiency.
Prevention and control	• Invest in improving water, sanitation and hygiene infrastructure to reduce breeding habitats for vectors. • Help communities implement structural, low-cost solutions for vector-borne disease control (screens on doors and windows, filling cracks and holes, improving housing quality). • Help communities implement ecological methods of vector-borne disease control including emerging biological control methods like the *Wolbachia*-based mosquito control or sterilized/gene-edited vectors with promising early results.
Management, treatment and remediation	• Identify realistic local vector-borne disease control, elimination or eradication strategies. • Develop new diagnostic methods for vector-borne disease, such as the point-of-care testing carried out for malaria. • Develop new therapeutic options for the treatment of vector-borne diseases, including vaccines that can prevent disease or reduce disease severity. • Train health care professionals to better screen, identify and provide guidance to patients on vector-borne diseases and local vector-borne disease control programmes.
Public awareness and behaviour change	• Utilize community engagement strategies to identify and disseminate effective vector-borne disease control strategies in a local context. • Raise public awareness of the importance of community waste management in controlling vector breeding habitats that contribute to disease outbreaks. • Educate the public on how human behaviours can influence vector-borne disease transmission, such as how habitat fragmentation, climate change and deforestation contribute to declining biodiversity.
Legislation and policy	• Fund vector-borne disease research, especially in neglected tropical disease areas and their intersection with environmental variables. • Fund research into vector-borne disease control, elimination and eradication strategies that do not focus on using insecticides (i.e., structural and ecological methods). • Implement policies that reduce poverty, improve the resilience of health care and public systems, and address environmental crises like global warming and collapsing biodiversity.
Global and regional action	• Implement child and maternal health considerations into all government policies, especially in land-use, building construction, and urban planning/design. • Invest in climate change mitigation and adaptation measures. • Promote global networks to monitor and respond to emerging vector-borne disease outbreaks.

Summary of key messages

1. The great variety of VBDs have significant impacts on the health of children, especially when these diseases are contracted during fetal or early childhood development, which can have lifelong impacts.
2. Urbanization and land-use decisions can help prevent or contribute to the VBD burden depending on how governments engage in the design and implementation processes.
3. Climate change is upending the traditional patterns of VBD transmission. Changes in temperature, humidity, overall precipitation and other meteorological and ecological variables will have a varying degree of impact on VBDs depending on the disease and region. Some VBDs may improve while others may decline in transmission, incidence or geographic distribution depending on local conditions. Funding local VBD programmes to improve forecasting and surveillance models will allow for improved VBD management and move from control to elimination and, finally, eradication.

Glossary of terms

VBD control: reduction of VBD incidence, prevalence, and/or morbidity/mortality to locally acceptable levels (e.g., *A. aegypti* mosquitoes and dengue)

VBD elimination: the reduction of VBD incidence caused by a specific pathogen in a defined geographical area with minimal risk of reintroduction to zero (e.g., elimination of local malaria transmission in the United States)

VBD eradication: the permanent and complete elimination of the worldwide incidence of infection caused by a specific pathogen with no risk of reintroduction (e.g., dracunculiasis)

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