

Will global warming undo the hard-won gains of prevention of mother-to-child transmission of HIV?

During pregnancy, women have a markedly diminished ability to tolerate heat stress.^[1] Increased internal heat production due to fetal growth and metabolism occurs alongside a reduced capacity to dissipate heat, stemming from fat deposition and a decreased ratio of body surface area to body mass. Heat intolerance of pregnant women is exacerbated by rises in ambient temperature, particularly during heatwaves. By implication, pregnant women and developing fetuses may be especially susceptible to the unfolding impacts of global warming. Globally temperatures are already rising, and future increments in southern Africa are expected to be twice the global rate.^[2]

Many studies have linked heat exposure during pregnancy to a range of adverse birth outcomes, including prematurity, stillbirth, low birth weight and congenital defects.^[3-5] Although less is known about the effects of heat on maternal health, associations have been reported with antepartum haemorrhage, hypertension, genital infections, and mental health conditions such as anxiety and depression.^[4,6,7] There are very few studies in Africa,^[8] where heat sensitivity may be even greater given that few women can afford air conditioning or other adaptation measures. Labour wards in the public sector in South

Africa (SA) also seldom have air conditioning, and temperatures in some facilities can exceed outdoor temperatures by as much as 4°C.^[9]

There are numerous self-reinforcing and bidirectional interactions between HIV and climate change.^[10] These impact directly on the health of HIV-infected people, but also on the socioeconomic determinants of HIV transmission, such as migration, gender inequities and poverty. Given mounting evidence of HIV-climate interactions, connecting heat exposure and risks of mother-to-child transmission (MTCT) of HIV may not be as implausible as it might first appear (Fig. 1).

Just as the causes of low birth weight and preterm birth are complex, so too are the reasons why some children but not others acquire HIV. Overwhelmingly, however, the most important factor affecting risk of MTCT is whether a woman receives and adheres to antiretroviral treatment. Extreme weather events, such as floods and wildfires, could undermine already fragile drug supply systems in SA. The mental health effects of hot weather and other consequences of climate change are considerable – though under-appreciated – and may well worsen drug adherence during the postpartum period, for example.^[11] Obstetric factors remain important determinants of

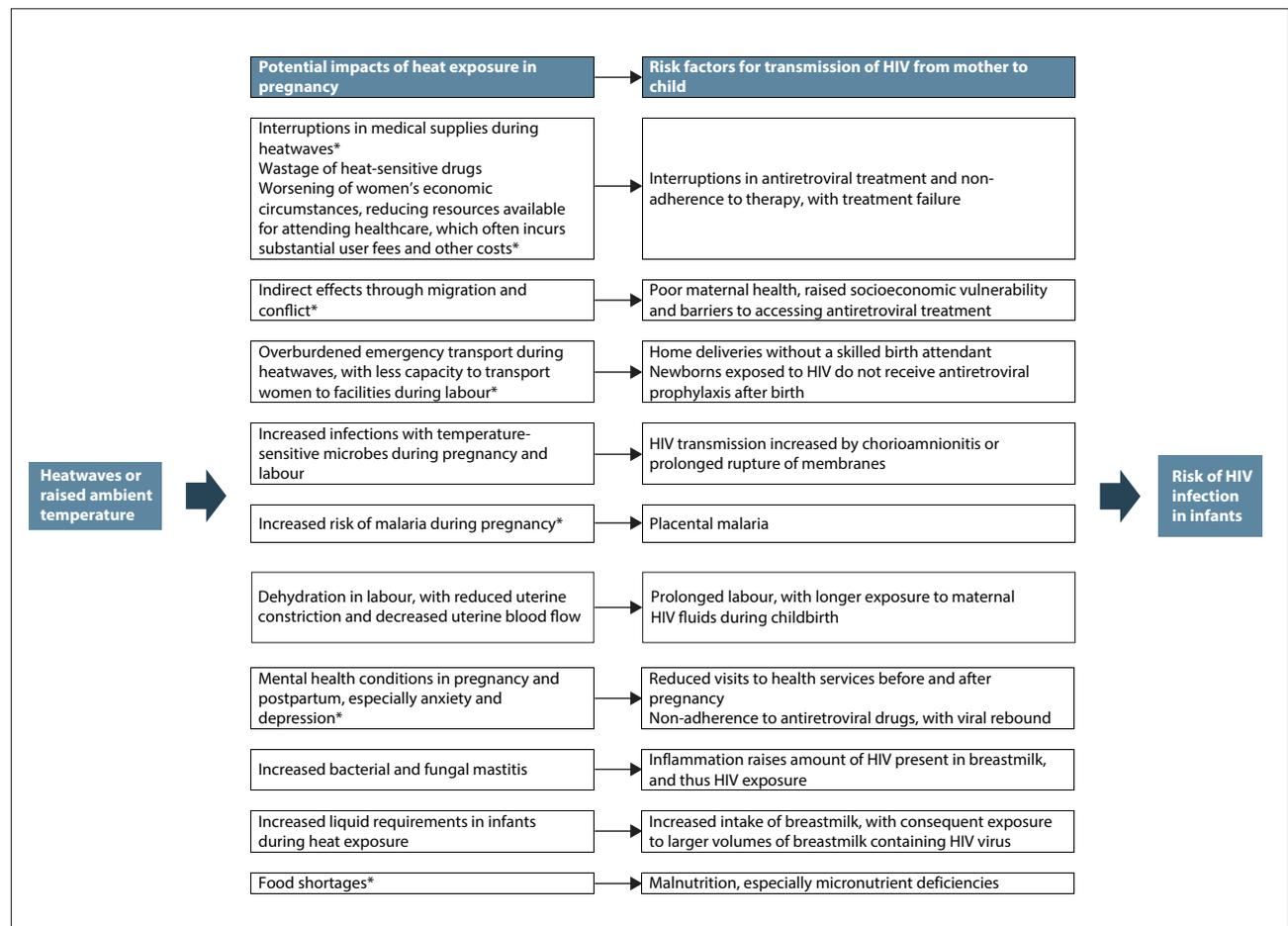


Fig. 1. Potential pathways between climate change and risk of mother-to-child transmission of HIV and other adverse birth outcomes. (*These impacts may also be caused by other manifestations of climate change, such as wildfires, storms, flooding and droughts.)

MTCT, especially in women who have not had HIV testing during pregnancy. Five percent of pregnant women in SA do not attend antenatal care, and the figure is considerably higher in some high-risk settings.^[12,13] The outcomes of hot weather in pregnancy, such as prematurity, prolonged rupture of membranes and genital infections, are important risk factors for MTCT.^[14,15] Additionally, during hot weather infants' intake of breastmilk is raised, increasing the total amount of HIV virus the infant is exposed to. Mastitis, which may occur given the close ties between raised temperatures and infection, is also a risk factor for MTCT.^[15,16]

It would be possible to assess these putative associations between temperature and MTCT using the large data sets on the HIV status of infants and the detailed meteorological data in SA. Similarly, connections between temperature and birth outcomes could be analysed using existing data sets. There are some complexities in these analyses, as there is no established critical window period of maternal sensitivity to hot temperatures, and it is not known whether drivers of adverse outcomes relate to levels or duration of heat exposure, or to temperature thresholds. Heat exposures may have immediate impacts on pregnancy, delayed (lagged) or cumulative effects, or a combination thereof.

Attribution studies connecting heat exposure to adverse birth outcomes and HIV infection in infants could have far-reaching implications. These findings could support measures such as increased natural ventilation and air conditioning in labour wards, prioritisation of hydration during labour, and the setting of specific heat-warning thresholds and plans for pregnant women. Evidence may also support arguments for building resilience in pregnant women by, for example, commencing the child support grant in pregnancy, rather than postpartum.^[17]

Estimates of the effect of heat exposure on birth outcomes could inform estimates of the burden of disease attributable to climate change in sub-Saharan Africa, a major evidence gap. The 2017 Global Burden of Disease report^[18] presents data on an array of diseases and environmental exposures, but makes no mention of climate change impacts – a glaring omission, possibly symptomatic of the non-involvement of most public health professionals in this rapidly emerging field. Quite rightly, adverse birth outcomes contribute many person-years lost in burden of disease estimates.

In conclusion, it is possible that global warming could undo the considerable gains made by prevention of MTCT programmes, and it will almost certainly have a notable impact on birth outcomes in the country. Such impacts bring into focus the practical actions required to support climate-conscious economic development, especially in the energy sector. Moreover, as has occurred many times in the past, focusing on harms to children may well be the best strategy to galvanise public health practitioners to action in the climate change arena.

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