

VIEWPOINT

Neglected Infections of Poverty in the United States and Their Effects on the Brain

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A group of neglected infections are emerging as important causes of psychiatric and mental illness among vulnerable populations living in extreme poverty in the United States. These chronic infections may partially account for the achievement gap noted among socioeconomically disadvantaged students.

The neglected tropical diseases (NTDs) are a group of chronic parasitic and related infections that can last decades or even the lifetime of an individual. During this time, they produce long-lasting and debilitating effects that impair productive capacity and child development. Indeed, the NTDs have actually been shown to trap people in poverty through these adverse effects.

The NTDs are not rare diseases. Quite the opposite—the NTDs are now recognized as the most common afflictions of impoverished people living in low- and middle-income countries of Africa, Asia, and Latin America. The NTDs are also considered a major reason why the “bottom billion” (ie, the 1.3 billion) people living below the poverty level cannot escape poverty.

In 2008, I identified a group of neglected parasitic and related infections of poverty among the extreme poor in the United States that closely resemble the NTDs in terms of their ability to produce chronic, debilitating, and poverty-promoting effects.¹ A new review reveals that these neglected infections remain widespread and disproportionately affect selected vulnerable populations, including African American and Hispanic populations living in poverty and the homeless.² Texas, the Gulf Coast region, and other parts of the southern United States represent the major affected areas, most likely because of their association with the extreme poverty in these regions.²

Now, additional information has determined that the neglected infections of poverty also cause important psychiatric and neurological effects on vulnerable populations in the southern United States (Table). Toxocariasis is a larval parasitic worm infection of the brain and viscera that results from accidental ingestion of *Toxocara* species eggs shed by dogs and cats. The eggs are nearly ubiquitous in disadvantaged urban and rural environments—the seroprevalence among disadvantaged African American populations exceeds 20%.^{1,2} An estimated 2.8 million African American individuals have toxocariasis.¹ In a large survey of the US population,³ it was recently found that children who are seropositive for *Toxocara* infection (a marker of exposure and infection) scored significantly lower on the Wechsler Intelligence Scale for Children-Revised and the Wide Range Achievement Test-Revised than did seronegative children. Toxocariasis is also associated with epilepsy and may be an important cause of epilepsy among African American children.²

Persons with toxocariasis are also more likely to be co-infected with *Toxoplasma gondii*, a parasitic protozoan that causes toxoplasmosis. Both of these zoonotic infections can be acquired from cats. Like toxocariasis, toxoplasmosis also disproportionately occurs among non-Hispanic black individuals and is linked to poverty.⁴ Approximately 1 million new cases occur annually in the United States.² A recent body of literature has identified provocative associations between toxoplasmosis and adult psychiatric illness, possibly a long-term consequence from congenital *Toxoplasma* infection and the resulting disruptions in fetal neurodevelopment.^{5,6} Specifically, seropositivity for toxoplasmosis has been strongly linked to bipolar mood disorder and schizophrenia.^{5,6} Still another congenital infection that causes intellectual disabilities (as well as losses in hearing and vision) and disproportionately affects African American children is congenital cytomegalovirus (CMV) infection.¹ In pregnancy, non-Hispanic black women are at substantially increased risk of acquiring primary CMV infection compared with non-Hispanic white women, especially during teen pregnancies.¹ An estimated 27 000 new cases of congenital CMV infection occur annually.¹

Beyond African American individuals, 2 neglected infections of poverty also affect other vulnerable populations in the United States. Neurocysticercosis, a larval pork tapeworm infection, is an important cause of epilepsy and chronic headaches in mostly Hispanic individuals.² My previous estimate indicates that between 41 000 and 169 000 people are living with cysticercosis in the United States.¹ Several studies have identified cognitive impairments in patients with neurocysticercosis and even dementia. In addition, the largest numbers of new cases of West Nile virus (WNV) infection are currently found in Texas—during a 2012 WNV outbreak there, almost 2000 cases were reported. Homeless populations are considered at risk for acquiring WNV infection. Neuroinvasive WNV infection has now been linked to chronic depression in a high proportion of patients.⁷

The links between these neglected infections of poverty and psychiatric and neurologic illnesses have potentially important implications for mental health care providers. The neglected infections outlined here are not rare diseases in the United States, and millions of people in this country are estimated to be living with chronic toxocariasis, toxoplasmosis, CMV infection, neurocysticercosis, and WNV infection. Together, they likely account for a substantial yet hidden burden of mental illness in the United States. These infections can be extremely challenging to diagnose, manage, treat, or prevent. A national awareness program should be imple-

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Table. Summary of the Effect of Neglected Infections of Poverty on the Mental Health of the US Population

Disease	Vulnerable Population Living in Poverty	Estimated No. of Cases	Neurocognitive or Psychiatric Effects
Toxocariasis	African American	Up to 2.8 million	Diminished cognitive function, epilepsy
Toxoplasmosis	African American	~1 Million new cases annually	Bipolar and other mood disorders, schizophrenia, vision loss
Congenital cytomegalovirus infection	African American	>6000 of Almost 30 000 new cases annually	Intellectual disabilities, hearing and vision loss
Neurocysticercosis	Hispanic American	Tens of thousands	Epilepsy, headache, cognitive impairments, dementia
West Nile virus infection	Homeless	1868 Cases reported in Texas in 2012	Depression

mented that would include specific commitments to the training of psychiatrists and mental health care professionals, with opportunities for joint patient management with experts in infectious and tropical diseases.

Yet another untapped aspect of the neglected infections of poverty is their potential contribution to the achievement gap that has been noted between wealthy suburban populations and socioeconomically disadvantaged minority populations. Specific programs of treatment and prevention could represent a major step toward improving the mental health of African American and Hispanic children affected by the neglected infections of poverty. Today in de-

veloping countries, low-cost programs of mass drug administration are being used to reduce or control the major NTDs affecting the cognitive development and mental health of children, including hookworm and other intestinal helminth infections and schistosomiasis. Although this approach would need to be modified to take on neglected infections specific to the United States, it could similarly produce important mental health benefits. The neglected infections of poverty represent a substantial yet hidden burden of mental illness that may require an unprecedented collaboration between psychiatrists, neurologists, and infectious and tropical disease experts.

ARTICLE INFORMATION

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