Social Epidemiology of HIV/TB Co-infection: A Triad with Poverty

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ABSTRACT:

The dual epidemics of Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) infection are of growing concern in Asia including countries like Nepal. Tuberculosis incidence rates correlate positively with poverty rates and with HIV incidence rates. TB is a leading cause of morbidity and mortality in patients with HIV infections. TB and HIV are commonly known as the diseases of poverty and their co-infection are known to be the deadliest mixture. Social epidemiology of TB and HIV infection reveals that there are more commonalities of risk factors which are associated with poor individual as well as communal socioeconomic status. Poverty is not only a major factor for complexity but also there are more issues associated with social inequality and inaccessibility to health care services. The double burden of TB and HIV pose a serious threat to the people's health that needs urgent address from health policy makers and health organizations to avert the economic loss in the future. This concept paper concludes that the TB/HIV co-infection is highly linked to an individual's socio economic status, sociopsychosocial and ecosocial paradigms of disease manifestation and their impact.

KEY WORDS
HIV/TB co-infection, Nepal, paradigm, poverty, social epidemiology, triad

INTRODUCTION
There are estimated to be over one million people worldwide who have TB and HIV co-infection. The burden of disease through HIV/TB co-infection is particularly high in sub-Saharan Africa, and the dual epidemics of TB and HIV are of growing concern in Asia. TB is a major cause of death among people living with HIV/AIDS, whose impaired immune systems make them particularly vulnerable to the devastating effects of TB. The current challenge is to find ways of preventing both TB and HIV, and to improve diagnosis and management of co-infection (World Health Organization, 2014). Tuberculosis (TB) and HIV co-infections place an immense burden on health care systems and pose particular diagnostic and therapeutic challenges (Pawlowski, et.al. 2012). TB is a leading cause of morbidity and mortality in patients with HIV/AIDS. HIV and TB are also intricately linked to malnutrition, unemployment, alcoholism, drug abuse, poverty and homelessness. The direct and indirect costs of illness due to TB and HIV are enormous, estimated to be more than 30 percent of the annual household income in developing countries and have a catastrophic impact on the economy in the developing world. (Russell, 2004) Thus, co-infection with HIV and TB (HIV-TB) is not only a medical condition, but a social and an economic disaster and is aptly described as the "double trouble".

Tuberculosis (TB) is a major public health problem in Nepal. HIV co-infection has further added a serious challenge to control TB. High prevalence of tuberculosis (5.97%) was found among HIV infected persons. Alcohol consumption was associated with the development of tuberculosis (Verma et. al.2012). An early diagnosis and treatment of TB in HIV infected individuals can help reduce not only the morbidity and mortality associated in this high risk group but also to get hold of the TB burden in Nepal.

This article aims to bring the concept of HIV/TB co-infection which is intricately linked with poverty and the triad are inteterrelated with one another making a vicious cycle of poverty trap which is a major challenge before the health policy makers to address the impact of this triad. This could help researchers, students, development workers and policy makers to focus on the burning health issue of rising HIV/TB dual infection which is the result of contemporary social epidemiological paradigms of income inequality, inequity and disparity. The article also aims to fill the gaps in paradigmatic thought of HIV/TB and poverty for future studies to develop preventive measures against the deadliest combo.

METHODS

Systematic review of literature regarding the social epidemiology of TB and HIV is done with key words and the relationship with poverty has been interpreted with reference to literatures to build up the concept of TB/HIV/poverty triad.

RESULT AND DISCUSSION

It is imperative to discuss the HIV/TB co-infection in individuals. The pairs HIV/poverty and TB/poverty relate between them to get a clear idea and the impact of the triad.

Social Epidemiology and TB infection

TB is a disease of poverty. It is widely recognized that poorer community, the greater the likelihood of being infected with TB. A lack of basic health services, poor nutrition and inadequate living conditions all contribute to the spread of TB and its impact upon the community. Poor nutrition and an inadequate diet weaken the immune system and increase the chances of infection. Overcrowded and poorly ventilated home and work environments make TB transmission more likely. An absence of good quality health care facilities is common in poor communities. With no health services to diagnose or treat patients, there is a longer delay between disease and cure, perpetuating the spread of TB. Studies suggest that the average patient loses three to four months of work time as a result of TB. Lost earnings can total up to 30% of the annual household income. In economic terms, TB decreases the output of a country's labour force and consequently reduces its gross domestic product. TB is a giant poverty producing mechanism. (Stop TB Partnership, 2002). Individual and household-level demographic, behavioural and socioeconomic risk factors and community-level socioeconomic status are found to be the major illness-provoking factors. In a multivariate model adjusting for demographic and behavioural risk factors, TB diagnosis is associated with cigarette smoking, alcohol consumption and low body mass index, as well as a lower level of personal education, unemployment and lower household wealth and in individual- and household-level risk factors, high levels of community income inequality are independently associated with increased prevalence of tuberculosis (Harling, et.al., 2007). Hence we can arrive at the concept that the TB is fuelled by poverty and vice-versa.

National TB control programmes play a vital role in curing TB patients and preventing deaths. The diagnosis and treatment of active TB have significantly reduced disease transmission and incidence in some countries. However, treatment programmes have not had a major, detectable effect on incidence on a large scale. One of the review studies presents TB care in developing countries is a challenge to show that early diagnosis and treatment can have a major effect on TB transmission and incidence, overriding or reinforcing other biological, social and economic determinants of TB epidemiology (C Dye, et.al. 2009). The socio epidemiological study reveals that both individual and community-level SES may play an important role in determining an individual's risk of becoming ill with tuberculosis (Harling, et.al., 2007)

Social Epidemiology and HIV infection

People generally tend to associate good health with wealth and bad health with poverty. There is a strong association between poverty and ill health, which also applies to the case of suffering from HIV infection too. Unlike diseases such as tuberculosis and malaria, HIV is mostly transmitted through unsafe sexual intercourse. Undeniably, more people live with HIV in poor countries than in rich ones. More than 60% of people living with HIV inhabit the world's poorest region: sub-Saharan Africa. Nevertheless, studies during the early stage of the epidemic suggested that HIV incidence initially occurred not amongst the poorest, but among better off members of society in this region. A decade later, infections still appear more concentrated among the urban employed and more mobile members of society, and consequently the wealthier groups (Mishra, et.al., 2007). There is however, no result that the AIDS/HIV infection has strong association with low socio-economic status and poverty. There is, however, no doubt that the HIV/AIDS infection has strong association with low socio-economic status and poverty. Effective actions to tackle HIV/AIDS must directly address these specific factors—the social inequalities—that drive HIV transmission in different contexts, and must overcome the obstacles to accessing treatment in different groups (Piot, et.al., 2007).

Theories in Social Epidemiology

Social epidemiology is defined as the study of the distribution of health outcomes and their social determinants (Berkman & Kawachi I., 2000). Following the work of Krieger's theories for social epidemiology (Krieger, 2001) which describes well for the social epidemiology of HIV/AIDS and Miller C. et.al. Model (2010) conceptualizes as the three important factors viz. structural factors, social factors and individual factors contributing social determinants of HIV/TB co-infection which is leveraged by poverty as presented in Table 1.

Table: 1 Social epidemiology of disease model: various factors at different levels that interact to influence health outcome, extracted from social epidemiology (Miller, C., et.al. 2010)

Structural Factors	Social Factors	Individual Factors
Legal structures Laws Law enforcement	**Social capital** Trust Norms	**Individual attributes** Sex Age Racial/Ethnicity Disability Psychological Biological Heredity
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Policy environments Economic policy Health and Education policy Social policy	**Community** Access to Health care service Community groups Schools and workplaces institutions Risk and protections	**Socioeconomic position** Income Education Occupation
Demographic changes Urbanization Migration Aging of the population	**Cultural context** Beliefs and patterns of behaviour Tradition Gender roles	**Behaviours** Hygiene Sexual Activity Diet and Exercise Health care practices
Institutions Government bodies Legislative Judiciary Regional and Local level bodies International bodies	**Social networks** Social influence Engagement Resources Social support	

Upstream Effects: From "Poverty to HIV/TB Co-infection"

Tuberculosis incidence rates correlate positively with poverty rates and with HIV incidence rates. Social inequality and the advent of AIDS are the major factors that aggravate the current situation of tuberculosis (Raphael M.G., et.al. 2012).
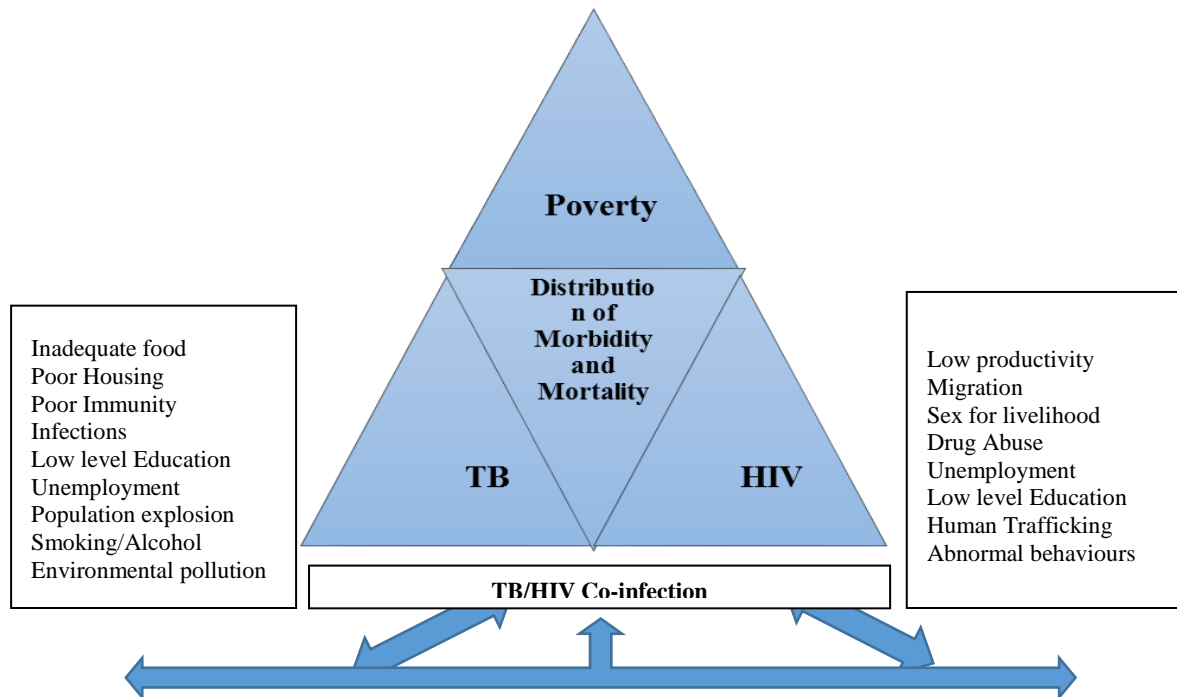
Figure 1: HIV-TB-Poverty Triad

CONCLUSION

The interaction of HIV with tuberculosis and vice versa must be considered while taking of either of the two diseases. Gaps still exist in our understanding of the extent to which socioeconomic determinants drive the current HIV/TB epidemic, the underlying processes linking socioeconomic determinants to HIV/TB, and how to best address these determinants. However, we believe that taking TB control forward is both desirable and possible and the current recognition of the importance of addressing the social determinants of health provides a real opportunity to expand the current paradigm for HIV/TB control. The key to success will be the capacity to design research in which different disciplines can develop a shared approach and common conceptual framework to address HIV/TB and their underlying socioeconomic status indicating poverty status. A great deal will be learned as partnerships involving actors from within and beyond the health sector conduct rigorous evaluations of the impact of economic and development aid programmes on HIV/TB control. The use of a social epidemiology framework to analyze risk factors for TB and HIV co-infection, particularly in Nepal require further investigation, highlighting the importance of including measures of individual as well as community-level socioeconomic status, and more distal emergent characteristics such as social inequality. The immense discussion concludes that the TB/HIV are highly linked to individual's socioeconomic status, sociopsychosocial and ecosocial paradigms of impact.

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