



Urban Health Bulletin: A Compendium of Resources

Issue #8 – May/June 2008 – Compiled by Environmental Health at USAID

http://www.ehproject.org/uh/urban_health.html

INTRODUCTION

Targeting is an especially critical challenge in addressing the health problems of the urban poor. The first two abstracts on vector disease and HIV/AIDS highlight this challenge particularly well. While the included abstracts continue to highlight this and other urban health problems, we were unable to find any articles for this issue on urban health **programming** – a sad comment on the shortage of operational research.

We welcome your comments and suggestions. If you are not already, please send your email address to receive future *Urban Health Bulletins*. If you have questions or comments about urban health issues, please contact:

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Urban Health Analysis

1 - *Arch Dis Child*. 2008 Jun; 93(6):479-84.

Infant morbidity in an Indian slum birth cohort.

Gladstone BP, Muliylil JP, Jaffar S, Wheeler JG, Le Fevre A, Iturriza-Gomara M, Gray JJ, Bose A, Estes MK, Brown DW, Kang G.

Department of Community Health, Christian Medical College, Vellore, India.

OBJECTIVE: To establish incidence rates, clinic referrals, hospitalisations, mortality rates and baseline determinants of morbidity among infants in an Indian slum.

DESIGN: A community-based birth cohort with twice-weekly surveillance. **SETTING:** Vellore, South India. **SUBJECTS:** 452 newborns recruited over 18 months, followed through infancy. **MAIN OUTCOME MEASURES:** Incidence rates of gastrointestinal illness, respiratory illness, undifferentiated fever, other infections and non-infectious morbidity; rates of community-based diagnoses, clinic visits and hospitalisation; and rate ratios of baseline factors for morbidity.

RESULTS: Infants experienced 12 episodes (95% confidence interval (CI) 11 to 13) of illness, spending about one fifth of their infancy with an illness. Respiratory and gastrointestinal symptoms were most common with incidence rates (95% CI) of 7.4

(6.9 to 7.9) and 3.6 (3.3 to 3.9) episodes per child-year. Factors independently associated with a higher incidence of respiratory and gastrointestinal illness were age (3-5 months), male sex, cold/wet season and household involved in beedi work. The rate (95% CI) of hospitalisation, mainly for respiratory and gastrointestinal illness, was 0.28 (0.22 to 0.35) per child-year.

CONCLUSIONS: The morbidity burden due to respiratory and gastrointestinal illness is high in a South Indian urban slum, with children ill for approximately one fifth of infancy, mainly with respiratory and gastrointestinal illnesses. The risk factors identified were younger age, male sex, cold/wet season and household involvement in beedi work.

2 - J Trop Pediatr. 2008 May 22.

The Determinants of Exclusive Breast Feeding in Urban Slums: A Community Based Study.

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The actual rate of Exclusive Breast Feeding (EBF) (up to the age of 6 months) is dismally low in urban slums of India. The reasons and determinants of this are debatable. The study was planned to understand the determinants of EBF in the infants in urban slums. A community-based cross sectional study was done in urban slums of Gwalior, India. The data were collected by interviewing the caregivers of 279 infants aged between 6 and 11 months from November 2005 to July 2006. Only 11 (3.8%) mothers knew that EBF should be done till six months and 22 (7.8%) actually practiced EBF. A total of 178 (63.8%) and 212 (76.0%) newborns were given pre- and post-lacteal feeds with 26.2% discarding colostrum. Only 22 (7.8%) practiced EBF. The early breastfeeding (BF) initiation, Ante Natal Clinic (ANC) visits, mothers' education and immunization visits were significantly associated with higher probability of EBF. There were a number of myths and misconceptions about BF in this urban slum population. The correct information about BF was more common amongst the women who had frequent contacts with health facilities due to any reason or during ANC or immunization visit. Similarly, it is the continuum of good health and feeding practices and the mothers who start early BF or get their child immunized regularly are more likely to EBF their children. Considering the widely prevalent myths and low rate of utilization of health services along with high potential benefits of EBF, every opportunity of mothers' interaction with the health facility should be utilized for promoting correct and EBF practices.

3 - J Urban Health. 2008 May; 85(3):428-42.

Provision and use of maternal health services among urban poor women in Kenya: what do we know and what can we do?

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In sub-Saharan Africa, the unprecedented population growth that started in the second half of the twentieth century has evolved into unparalleled urbanization and an increasing proportion of urban dwellers living in slums and shanty towns, making it imperative to pay greater attention to the health problems of the urban poor. In particular, urgent efforts need to focus on maternal health. Despite the lack of reliable trend data on maternal mortality, some investigators now believe that progress in maternal health has been very slow in sub-Saharan Africa.

This study uses a unique combination of health facility- and individual-level data collected in the slums of Nairobi, Kenya to: (1) describe the provision of obstetric care in the Nairobi informal settlements; (2) describe the patterns of antenatal and delivery care, notably in terms of timing, frequency, and quality of care; and (3) draw policy implications aimed at improving maternal health among the rapidly growing urban poor populations. It shows that the study area is deprived of public health services, a finding which supports the view that low-income urban residents in developing countries face significant obstacles in accessing health care.

This study also shows that despite the high prevalence of antenatal care (ANC), the proportion of women who made the recommended number of visits or who initiated the visit in the first trimester of pregnancy remains low compared to Nairobi as a whole and, more importantly, compared to rural populations. Bivariate analyses show that household wealth, education, parity, and place of residence were closely associated with frequency and timing of ANC and with place of delivery. Finally, there is a strong linkage between use of antenatal care and place of delivery. The findings of this study call for urgent attention by Kenya's Ministry of Health and local authorities to the void of quality health services in poor urban communities and the need to provide focused and sustained health education geared towards promoting use of obstetric services.

4 - J Antimicrob Chemother. 2008 Jun; 61(6): 1315-8.

High rate of resistance to locally used antibiotics among enteric bacteria from children in Northern Ghana.

Djie-Maletz A, Reither K, Danour S, Anyidoho L, Saad E, Danikuu F, Ziniel P, Weitzel T, Wagner J, Bienzle U, Stark K, Seidu-Korkor A, Mockenhaupt FP, Ignatius R.

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OBJECTIVES: Information on antimicrobial susceptibility of bacterial pathogens is scarce in resource-poor settings. We determined the susceptibility of bacterial enteric pathogens and faecal *Escherichia coli* isolates obtained from children in urban Tamale, Northern Ghana, to antibiotics widely used in the that area [ampicillin or amoxicillin, trimethoprim/sulfamethoxazole (SXT) and chloramphenicol] and to alternative drugs.

METHODS: Five *Shigella* spp., 6 *Salmonella* spp. and 318 *E. coli* were isolated from stool specimens obtained from 367 children with or without acute diarrhoea. Isolates were differentiated using standard laboratory procedures and tested using a breakpoint microbroth dilution method for their susceptibility to 18 antimicrobials and by disc diffusion for their susceptibility to chloramphenicol.

RESULTS: Although the salmonellae showed an acceptable resistance pattern, *E. coli* isolates and the closely related shigellae were highly resistant. About 91% and 81% of *E. coli* isolates from patients or controls, respectively, were resistant to ampicillin (MICs \geq 8 mg/L), 88% and 76% to trimethoprim/sulfamethoxazole (MICs \geq 80/4 mg/L) and 46% and 41% to chloramphenicol (inhibition zones \leq 12 mm). Resistance to beta-lactam antibiotics or chloramphenicol was observed more frequently among isolates obtained from infants when compared with older children (1-4 years of age).

CONCLUSIONS: Enteric bacteria from children in urban Northern Ghana are highly resistant to antibiotics used in that area. Therefore, new antibiotics should be introduced for the treatment of infections caused by these bacteria. Additionally, the establishment of a surveillance of the prevalence of the main bacterial infectious agents and their antimicrobial resistance is desirable.

5 - *J Urban Health*. 2008 Jun 18

"Coming to Town": The Impact of Urbanicity, Cigarette Advertising, and Network Norms on the Smoking Attitudes of Black Women in Cape Town, South Africa.

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This study was conducted to examine the effect of urban living on smoking attitudes among black African women in South Africa. We examine how urbanicity affects attitudes toward smoking and how it moderates the relationship between both advertising exposure and network norms on black women's smoking attitudes. Respondents were 975 black women currently living in Cape Town townships, some of which were raised in rural villages or small towns. Respondents completed a cross-sectional survey, which included data on smoking attitudes, norms, and exposure to cigarette advertising. Multiple linear regression analysis was performed with smoking attitudes as the response variable, and urbanicity, cigarette advertising exposure, and network smoking norms as primary explanatory variables. Interactions were tested to determine whether urbanicity modified the effect of advertising exposure and network norms on smoking attitudes. Independent effects of urbanicity, exposure to cigarette advertising, and greater smoking prevalence within women's networks were associated with more favorable smoking attitudes. In addition, urbanicity moderated the relationship between network smoking norms and smoking attitudes, but not cigarette advertising exposure and smoking attitudes. Urbanicity, cigarette advertising, and networks play important roles in women's attitudes toward smoking, and potentially, smoking behavior. Overall, our results suggest that strong and creative anti-smoking efforts are needed to combat the potential for a smoking epidemic among an increasingly urbanized population of black women in South Africa and similar emerging markets. Additional research is warranted.

6 - *Int J Drug Policy*. 2008 Jun 11.

The social context of initiation into injecting drugs in the slums of Makassar, Indonesia.

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BACKGROUND: The association between socio-economic marginalisation in urban poor neighbourhoods and the prevalence of violence, crime, drug use and drug dealing has been well documented. However few studies have explored the social context of the transition to, initiation and maintenance of drug injection career in slum areas in developing countries. This study examines the lived experience of young men in initiating and maintaining drug injection in slum areas, commonly named lorong, in the city of Makassar, Indonesia.

METHOD: In-depth interviews were conducted with 18 male injecting drug users who attended a drop-in centre for drug users in the city.

RESULTS: The interviews revealed that the pharmacological effects of putaw (street grade heroin) and the economics of injection were factors in initiating and maintaining injection. Importantly, the intersection of socio-economic deprivation with pursuing the status of rewa (local concept of masculinity) and the dynamics of gang participation led many members of the lorong into a drug injection career, making them vulnerable for HIV and other blood-borne viral infections.

CONCLUSION: To be more effective, the existing harm reduction programmes in Makassar that focus on individualistic behavioural changes need to be complemented with community-based programmes that take into consideration the social and structural context of risk-taking practices amongst young people in the lorong.

Urban Environmental Health

7 - *Trop Med Int Health*. 2008 Jun; 13(6):835-44.

Associations among handwashing indicators, wealth, and symptoms of childhood respiratory illness in urban Bangladesh.

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OBJECTIVES: To explore the relationship of easy to collect handwashing indicators with socioeconomic status and reported respiratory disease among children <5 years of age.

METHODS: We added several handwashing indicators to a population-based, cross-sectional study of respiratory illness in Dhaka, Bangladesh. We constructed a wealth index using 12 household characteristics analysed with principal component analysis to assess socioeconomic status.

RESULTS: Of 6970 households, 92% had a bar of body soap, 41% had a place with water to wash hands inside the house, and 40% had soap present at the most convenient place to wash hands. Handwashing indicators were more common among households with higher socioeconomic status. Within each wealth quintile a place to wash hands within the household was strongly associated with the presence of soap at the handwashing location (odds ratios 13-70). In general estimated equation models that controlled for socioeconomic status, the presence of a place inside the house with water to wash hands was the only handwashing indicator significantly associated with a child in the household who reported cough or difficulty breathing in the preceding 7 days (adjusted odds ratio 0.95, 95% confidence interval 0.93-0.98, $P < 0.001$).

CONCLUSION: Handwashing indicators were strongly influenced by socio-economic status and so would not be an independent measure of handwashing behaviour. Handwashing promotion efforts in urban Dhaka that include specific efforts to provide handwashing facilities inside the house are more likely to improve handwashing behaviour than interventions that ignore this component.

8 - J Water Health. 2008 Jun; 6(2):289-99.

Exploring intra-household factors for diarrhoeal diseases: a study in slums of Delhi, India.

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While infrastructure conditions constitute 'primary routes', contamination of water within households and other behavioural determinants are considered as 'secondary routes'. However, recontaminated water has been considered not to constitute a serious risk though it occurs commonly in poorer societies. A study was conducted in Delhi where individual risk factors were located within a larger socio-economic, political and administrative framework, as they were often independent variables. This component of the larger study hypothesised that behavioural factors at individual household levels lose significance as major determinants of diarrhoeal diseases once they are analysed in a holistic epidemiology frame. Determinants at the household level were explored through a dataset based on a primary survey of 300 households in three slum clusters. Amongst households storing municipal water (proven to be safe at source), adhering to the best storage practices did not translate into lower incidence rates as compared to those with relatively unsafe practices. The explanation lay in factors which were external to the home and beyond the control of the affected household. Thus, household level behavioural factors such as storage practises should not be analysed in isolation as determinants of diarrhoeal illness particularly when pitted against stronger neighbourhood and external determinants.

9 - *J Trop Pediatr.* 2008 May 22.

Relationship between Intestinal Parasitic Infection in Children and Soil Contamination in an Urban Slum.

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Purpose: Urban slums are well known for their high infant mortality and morbidity rates, and parasitic infections seem to be a common problem among these children. The aim of the present study was to determine protozoa and nematodes prevalence among children of a selected community located in São Paulo, Brazil, and assess the relation between soil and children infection.

Methods: Soil contamination samples from 15 strategic locations in the slum area as well as stool samples (examined for protozoa and nematodes through five different methods) from 120 children aged 2-14 years (49% M: 51% F, mean +/- SD = 7.9 +/- 3.8 years) were assessed in a cross-sectional study. Children's domicile locations were determined, and a comparative analysis was undertaken to correlate children and soil infection.

Results: Overall infection rate was 30.8% (n = 37), without difference between genders. The most frequent intestinal protozoa were *Endolimax nana* (20.8%), *Entamoeba coli* (15.8%) and *Giardia lamblia* (16.7%). Frequencies of *Ascaris lumbricoides* and *Enterobius vermicularis* in stool samples were 2.5 and 1.7%, respectively. No cases of hookworms, *Schistosoma mansoni* or *Tricuris trichiura* were identified. Polyparasitism occurred in 10.8% of the children, while 69.2% were free of parasitic infections. Out of the 15 soil samples analyzed, *Ascaris* sp. eggs were found in 20% and hookworm eggs in 6.7%.

Conclusion: Helminth infection is not as prevalent as previously reported in urban slums in São Paulo, neither as clinical disease nor in soil samples. Protozoa intestinal infection, however, is still frequent in some marginalized populations in São Paulo. Improvement in living standards, mostly sanitation might decrease the prevalence of these diseases.

10 - *Sci Total Environ.* 2008 Jun 17.

Characterizing air pollution in two low-income neighborhoods in Accra, Ghana.

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Sub-Saharan Africa has the highest rate of urban population growth in the world, with a large number of urban residents living in low-income "slum" neighborhoods.

We conducted a study for an initial assessment of the levels and spatial and/or temporal patterns of multiple pollutants in the ambient air in two low-income neighborhoods in Accra, Ghana. Over a 3-week period we measured (i) 24-hour integrated PM(10) and PM(2.5) mass at four roof-top fixed sites, also used for particle speciation; (ii) continuous PM(10) and PM(2.5) at one fixed site; and (iii) 96-hour integrated concentration of sulfur dioxide (SO(2)) and nitrogen dioxide (NO(2)) at 30 fixed sites. We also conducted seven consecutive days of mobile monitoring of PM(10) and PM(2.5) mass and submicron particle count. PM(10) ranged from 57.9 to 93.6 $\mu\text{g}/\text{m}^3$ at the four sites, with a weighted average of 71.8 $\mu\text{g}/\text{m}^3$ and PM(2.5) from 22.3 to 40.2 $\mu\text{g}/\text{m}^3$, with an average of 27.4 $\mu\text{g}/\text{m}^3$. PM(2.5)/PM(10) ratio at the four fixed sites ranged from 0.33 to 0.43. Elemental carbon (EC) was 10-11% of PM(2.5) mass at all four measurement sites; organic matter (OM) formed slightly less than 50% of PM(2.5) mass. Cl, K, and S had the largest elemental contributions to PM(2.5) mass, and Cl, Si, Ca, Fe, and Al to coarse particles. SO(2) and NO(2) concentrations were almost universally lower than the US-EPA National Ambient Air Quality Standards (NAAQS), with virtually no variation across sites. There is evidence for the contributions from biomass and traffic sources, and from geological and marine non-combustion sources to particle pollution. The implications of the results for future urban air pollution monitoring and measurement in developing countries are discussed.

11 - Sci Total Environ. 2008 Jun 2.

Sources of nitrate and ammonium contamination in groundwater under developing Asian megacities.

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The status of nitrate (NO(3)(-)), nitrite (NO(2)(-)) and ammonium (NH(4)(+)) contamination in the water systems, and the mechanisms controlling their sources, pathways, and distributions were investigated for the Southeast Asian cities of Metro Manila, Bangkok, and Jakarta. GIS-based monitoring and dual isotope approach (nitrate $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$) suggested that human waste via severe sewer leakage was the major source of nutrient contaminants in Metro Manila and Jakarta urban areas.

Furthermore, the characteristics of the nutrient contamination differed depending on the agricultural land use pattern in the suburban areas: high nitrate contamination was observed in Jakarta (dry fields), and relatively lower nutrients consisting mainly of ammonium were detected in Bangkok (paddy fields). The exponential increase in NO(3)(-)- $\delta^{15}\text{N}$ along with the NO(3)(-) reduction and clear $\delta^{18}\text{O}/\delta^{15}\text{N}$ slopes of NO(3)(-) (approximately 0.5) indicated the occurrence of denitrification. An anoxic subsurface system associated with the natural geological setting (e.g., the old tidal plain at Bangkok) and artificial pavement coverage served to buffer NO(3)(-) contamination via active denitrification and reduced nitrification.

Our results showed that NO(3)(-) and NH(4)(+) contamination of the aquifers in Metro Manila, Bangkok, and Jakarta was not excessive, suggesting low risk of drinking groundwater to human health, at present. However, the increased nitrogen

load and increased per capita gross domestic product (GDP) in these developing cities may increase this contamination in the very near future. Continuous monitoring and management of the groundwater system is needed to minimize groundwater pollution in these areas, and this information should be shared among adjacent countries with similar geographic and cultural settings.

Urban Vector Disease

12 - *J Infect Dis.* 2008 Jun 3.

Factors Determining the Heterogeneity of Malaria Incidence in Children in Kampala, Uganda.

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Background. Malaria risk may be heterogeneous in urban areas of Africa. Identifying those at highest risk for malaria may lead to more targeted approaches to malaria control.

Methods. A representative sample of 558 children aged 1-10 years were recruited from a census population in a single parish of Kampala and followed up for 2 years. Malaria was diagnosed when a child presented with a new episode of fever and a thick blood smear positive for parasites. Multivariate analysis was used to identify independent predictors of malaria incidence.

Results. A total of 695 episodes of uncomplicated malaria were diagnosed after 901 person years of follow-up. Sick cell trait (relative risk [RR], 0.68 [95% confidence interval {CI}, 0.52-0.90]), glucose-6-phosphate dehydrogenase deficiency in female children (RR, 0.48 [95% CI, 0.31-0.75]), and use of an insecticide-treated bed net (RR, 0.52 [95% CI, 0.32-0.83]) were associated with a lower risk of malaria. The distance of the subject's residence from a swamp bordering the parish showed a strong "dose-response" relationship; living in the swamp was the strongest predictor of malaria risk (RR, 3.94 [95% CI, 2.61-5.97]).

Conclusion. Malaria incidence was highly heterogeneous in this urban cohort of children. Malaria control interventions in urban areas should target populations living in pockets of high malaria risk.

13 - *PLoS ONE*. 2008 May 7; 3(5):e2132.

Antimalarial drug quality in the most severely malarious parts of Africa - a six country study.

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A range of antimalarial drugs were procured from private pharmacies in urban and peri-urban areas in the major cities of six African countries, situated in the part of that continent and the world that is most highly endemic for malaria. Semi-quantitative thin-layer chromatography (TLC) and dissolution testing were used to measure active pharmaceutical ingredient content against internationally acceptable standards. 35% of all samples tested failed either or both tests, and were substandard.

Further, 33% of treatments collected were artemisinin monotherapies, most of which (78%) were manufactured in disobedience of an appeal by the World Health Organisation (WHO) to withdraw these clinically inappropriate medicines from the market. The high persistence of substandard drugs and clinically inappropriate artemisinin monotherapies in the private sector risks patient safety and, through drug resistance, places the future of malaria treatment at risk globally.

14 - *Clin Infect Dis*. 2008 Jun 15; 46(12):1822-8.

Chagas disease transmission in periurban communities of Arequipa, Peru.

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BACKGROUND: Chagas disease, caused by *Trypanosoma cruzi* infection, is an urban problem in Arequipa, Peru, and the epidemiology of Chagas disease is likely to be quite different in this area, compared with in rural zones.

METHODS: We conducted a serosurvey of 1615 children <18 years old in periurban districts that included hillside shantytowns and slightly more affluent low-lying communities. In addition, 639 adult residents of 1 shantytown were surveyed to provide data across the age spectrum for this community. **RESULTS:** Of 1615 children, 75 (4.7%) were infected with *Trypanosoma cruzi*. Infection risk increased by 12% per year of age, and children living in hillside shantytowns were 2.5 times as likely to be infected as were those living in lower-lying communities. However, age-prevalence data from 1 shantytown demonstrated that adults were no more likely to be seropositive than were teenagers; the results of maximum likelihood modeling suggest that *T. cruzi* transmission began in this community <20 years ago.

CONCLUSIONS: The problem of Chagas disease in periurban settings, such as those around Arequipa, must be addressed to achieve elimination of vector-borne *T. cruzi* transmission. Identification of infected children, vector-control efforts, and education to avoid modifiable risk factors are necessary to decrease the burden of Chagas disease.

HIV/AIDS

15 - *BMC Pediatr.* 2008 May 21; 8:22.

HIV prevalence in severely malnourished children admitted to nutrition rehabilitation units in Malawi: geographical & seasonal variations a cross-sectional study.

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BACKGROUND: Severe malnutrition in childhood associated with HIV infection presents a serious humanitarian and public health challenge in Southern Africa. The aim of this study was to collect country wide data on HIV infection patterns in severely malnourished children to guide the development of integrated care in a resource limited setting.

METHODS: A cross sectional survey was conducted in 12 representative rural and urban Nutrition Rehabilitation Units (NRUs), from each of Malawi's 3 regions. All children and their caretakers admitted to each NRU over a two week period were offered HIV counseling and testing. Testing was carried out using two different rapid antibody tests, with PCR testing for discordant results. Children under 15 months were excluded, to avoid difficulties with interpretation of false positive rapid test results. The survey was conducted once in the dry/post-harvest season, and repeated in the rainy/hungry season.

RESULTS: 570 children were eligible for study inclusion. Acceptability and uptake of HIV testing was high: 523(91.7%) of carers consented for their children to take part; 368(70.6%) themselves accepted testing. Overall HIV prevalence amongst children tested was 21.6%(95% confidence intervals, 18.2-25.5%). There was wide variation between individual NRUs: 2.0-50.0%. Geographical prevalence variations were significant between the three regions ($p < 0.01$) with the highest prevalence being in the south: Northern Region 23.1%(95%CI 14.3-34.0%), Central Region 10.9%(95%CI 7.5-15.3%), and Southern Region 36.9%(95%CI 14.3-34.0%). HIV prevalence was significantly higher in urban areas, 32.9%(95%CI 26.8-39.4%) than in rural 13.2%(95%CI 9.5-17.6%)($p < 0.01$). NRU HIV prevalence rates were lower in the rainy/hungry season 18.4%(95%CI 14.7-22.7%) than in the dry/post-harvest season 30.9%(95%CI 23.2-39.4%) ($p < 0.001$).

CONCLUSION: There is a high prevalence of HIV infection in severely malnourished Malawian children attending NRUs with children in urban areas most likely to be infected. Testing for HIV is accepted by their carers in both urban and rural areas. NRUs could act as entry points to HIV treatment and support programmes for affected children and families. Recognition of wide geographical variations in childhood HIV prevalence will ensure that limited resources are initially targeted to areas of highest need. These findings may have implications for the other countries with similar patterns of childhood illness and food insecurity.

16 - *J Int Assoc Physicians AIDS Care (Chic Ill)*. 2008 Jun;7(2):74-81.

Psychosocial Impact of Poverty on Antiretroviral Non-adherence Among HIV-TB Co-infected Patients in Lima, Peru.

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Objective. Tuberculosis and HIV co-infection poses unique clinical and psychosocial complexities that can impact non-adherence to highly active antiretroviral treatment (HAART).

Methods. This was a prospective case series to identify risk factors for HAART non-adherence among 43 patients with HIV and tuberculosis (TB) in Lima, Peru. Non-adherence was defined by patient self-report.

Results. The median initial CD4 and HIV viral load were 63 and 159,000, respectively. Patients had received a median of 6.1 months of ART. Univariable analysis found low social support, substance use, and depression to be associated with non-adherence. In multivariable analysis, low social support was associated with non-adherence.

Conclusions. In the authors' urban cohort of HIV-TB co-infected individuals in Lima, Peru, substance use, depression, and lack of social support were key barriers to adherence. These findings suggest that adherence interventions may be unsuccessful unless they target the underlying psychosocial challenges faced by patients living with TB and AIDS.