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Urban Health Bulletin: A Compendium of Resources

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Answering the “So what?” Question: I was impressed by how many of the abstracts in this issue did what all too often research neglect to do – suggest to the non-research public health community what actions are recommended based on their findings.

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	Urban Environmental Health	Urban Vector Disease
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Urban Health Analysis

Soc Sci Med. 2009 Nov 6.

Rural-urban migration and health: Evidence from longitudinal data in Indonesia.

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Previous studies on the impact of migration on health often face the difficulties of choosing the proper comparison group and addressing potential selection of migration. Using longitudinal data for 1997 and 2000 from Indonesia, this paper examines the effect of rural-urban migration on physical and psychological health, by (1) comparing the health of migrants with that of the appropriate group of comparison, people who remained in rural origins, and (2) studying health both prior to and after migration to adjust for possible selection bias.

The research further explores various socioeconomic, psychosocial, and behavioral pathways mediating the migration effect. Results show that rural-urban labor migration increased the risk of psychological disorder as measured by depressive symptoms. This was largely a result of reduced social support due to family disruption, because the deleterious effect was particularly strong for migrants who moved alone and was negligible for migrants moving with family members. In contrast, migration had little impact on physical health in the medium term. This was largely attributed to the multiple offsetting influences of migration: migration improved economic status and living standards but led to increased work-related stressors and barriers to health utilization. In addition, despite earning higher income, migrants tend to underconsume and remit a large amount of earnings to original families, which hindered potential health gains from improved economic well-being.

Trop Med Int Health. 2009 Oct; 14(10): 1199-209.

Effect of behaviour change communication on qualified medical care-seeking for sick neonates among urban poor in Lucknow, northern India: a before and after intervention study.

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OBJECTIVE: To assess the impact of a behaviour change communication (BCC) intervention on qualified medical care-seeking for sick newborns in urban Lucknow, northern India.

METHODS: Before and after intervention study conducted at two urban public hospitals at Lucknow. Neonates who did not have any morbidity or congenital malformation and were residents of Lucknow were enrolled within 48 h of birth and followed once between 6 and 8 weeks at the outpatients' clinic or home to assess the primary outcome measure which was qualified medical care-seeking for any neonatal illness. Mothers in the after-intervention phase received BCC intervention at enrolment, targeted at identification of danger signs of neonatal illnesses and promotion of qualified medical care-seeking. Analysis was by intention to treat.

RESULTS: In the before-intervention phase, 510 neonates were enrolled (from March 2007 to August 2007) and 481 (94.3%) were followed up. In the after-intervention phase, 510 neonates were enrolled (September 2007-April 2008) and 490 (96.1%) were followed up. Neonatal morbidity was 50.3% (242/481) and 44.3% (217/490) in before and after intervention phases, respectively. Qualified medical care-seeking for neonatal illnesses was significantly higher among mothers after-intervention (OR = 2.12; 95% CI = 1.42-3.16; P = 0.0001).

CONCLUSION: Since the behaviour change intervention package led to significant improvement in qualified medical care-seeking for sick newborns, this may be tested for effectiveness in other settings and considered for scaling up here, with rising proportion of institutional deliveries.

Trop Med Int Health. 2009 Nov 2.

Is mortality among under-five children in Nairobi slums seasonal?

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Objective - To investigate the seasonal pattern of overall mortality among children aged below 5 years living in two informal settlements in Nairobi City.

Methods - We used data collected from January 2003 to December 2005 in the Nairobi Urban Health and Demographic Surveillance System on demographic events (birth, death, and migration). Analyses of seasonal effects on under-five mortality are based on Poisson regression controlling for sex, age, study site and calendar year.

Results - During the study period, there were 17 878 children below 5 years in the study sites. Overall 436 under-five deaths were recorded. The overall death rate for the under-five children

was 19.95 per 1 000 person years. There is a significant seasonal variation of under-five mortality. The mortality risk was significantly higher in the second and third quarters of year than in the fourth quarter (RR = 1.6, CI: 1.3-2.2 and RR = 1.5, CI: 1.1-2.0).

Conclusion This paper demonstrates that overall mortality among under-five children in the urban poor is seasonal. Overall during the second quarter of the year, the death rate increases by nearly twofold. This evidence generated here may help to support well targeted interventions in reducing under-five mortality in the slums.

Am J Trop Med Hyg. 2009 Nov; 81(5): 770-5.

Seasonal pattern of pneumonia mortality among under-five children in Nairobi's informal settlements.

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Using longitudinal data from the Nairobi Urban and Demographic Surveillance System (NUHDSS), we examined the seasonal pattern of pneumonia mortality among under-five children living in Nairobi's slums. We included 17,787 under-five children resident in the NUHDSS from January 1, 2003 to December 31, 2005 in the analysis. Four hundred thirty-six deaths were observed and cause of death was ascertained by verbal autopsy for 377 of these deaths. Using Poisson regression, we modeled the quarterly mortality risk for pneumonia. The overall person-years (PYs) were 21,804 giving a mortality rate of 20.1 per 1,000 PYs in the study population. Pneumonia was the leading cause of death contributing 25.7% of the total deaths. Pneumonia mortality was highest in the second quarter (risk ratio [RR] = 2.3, confidence interval [CI]: 1.2-4.2 compared with the fourth quarter). The study provides evidence that pneumonia-related mortality among under-fives in Nairobi's slums is higher from April to June corresponding to the rainy season and the beginning of the cold season.

Matern Child Health J. 2009 Oct 1.

Predictors of Preterm Births and Low Birthweight in an Inner-City Hospital in Sub-Saharan Africa.

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Adverse birth outcomes remain significant contributors to perinatal mortality as well as developmental disabilities worldwide but limited evidence exists in sub-Saharan Africa based on a conceptual framework incorporating neighborhood context. This study therefore set out to determine the prevalence and risk factors for preterm births and low birthweight in an urban setting from this region. A cross-sectional study of all live births from May 2005 to December 2007 in an inner-city maternity hospital in Lagos, Nigeria. Factors predictive of preterm births and low birthweight were determined by unconditional multivariable logistic regression within a conceptual framework for adverse birth outcomes. Population attributable risk (PAR%) for each factor was also determined. Of the 4,314 newborns enrolled, 859 (19.9%) were preterm and 440 (10.2%) were low birthweight. One-third of mothers received no antenatal care while about 6% had HIV and another 6% had a history of hypertensive disorders. About 43% of the low birthweight infants were born full term. Maternal predictors of preterm delivery and/or low

birthweight were marital status, occupation, residential accommodation with shared sanitation facilities, lack of antenatal care, absence of previous cesarean section, hypertensive disorders and antepartum hemorrhage. Gender and intrauterine growth restriction (IUGR) were also predictive of low birthweight. IUGR (PAR = 48.74%) and lack of prior cesarean section (PAR = 41.99%) were the leading contributors to preterm birth and/or low birthweight. The burden of preterm and low birthweight deliveries in this setting is associated with modifiable individual and neighborhood-level risk factors that warrant community-oriented public health interventions.

Ann Hum Biol. 2009 Oct 25.

The effect of socio-economic status and area of residence on household food variety in Morocco.

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Background: In Morocco, few studies have specifically addressed the association between food variety and household socio-economic status and area of residence.

Aim: The study's objective was to obtain a qualitative description of food consumption in samples of Moroccan households and to examine the influence of socio-economic factors and area of residence on their food variety.

Subjects and methods: A qualitative food frequency questionnaire was administered by adolescent school pupils in their own households between March 2005 and March 2006 in 526 households in the regions of Marrakesh north of the High Atlas range and Ouarzazate to the south. We calculated the Food Variety Index (FVI) based on 183 food items and compared scores for advantaged/disadvantaged and urban/rural households.

Results: Mean FVI scores for all individuals and total food groups differ significantly between the area of residence, urban and peri-urban Marrakesh and urban Ouarzazate having the highest scores. The mean total FVI scores, presented according to the household's socio-economic status from highest to lowest, are 123.8 +/- 17.1 for urban Marrakesh, 107.6 +/- 21.6 for urban Ouarzazate, 92.0 +/- 22.4 for rural Skoura, 110.5 +/- 21.5 for peri-urban Marrakesh and 89.9 +/- 10.8 for rural Iguerferouane (F-test = 26.7, p < 0.001). Advantaged households have significantly greater variety than disadvantaged households for all variables only in the two urban samples. In peri-urban Marrakesh and rural Skoura, there are no significant differences between advantaged and disadvantaged households.

Conclusion: In our Moroccan sample, food variety is distributed according to two patterns: One based on area of residence, urban areas having greater variety than rural areas, and the other on socio-economic factors, with advantaged households having higher FVI values but only in urban areas. The limited availability of certain foods and food preferences by the populations mean that not all households are able to diversify their diets.

Health Policy Plan. 2009 Oct 20.

Medicine prices in urban Mozambique: a public health and economic study of pharmaceutical markets and price determinants in low-income settings.

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It has been suggested that medicines are unaffordable in low-income countries and that world manufacturing and trade policies are responsible for high prices. This research investigates medicine prices in urban Mozambique with the objective of understanding how prices are formed and with what public health implications. The study adopts an economic framework and uses a combination of quantitative and qualitative methods to analyse local pharmaceutical prices and markets.

The research findings suggest that: (a) local mark-ups are responsible for up to two-thirds of drugs' final prices in private pharmacies; (b) statutory profit and cost ceilings are applied unevenly, due to lack of government control and collusion among suppliers; and (c) the local market appears to respond effectively to the urban population's diverse needs through its low-cost and high-cost segments, although uncertainty around the quality of generics may be inducing consumers to purchase less affordable drugs.

We conclude that local markets play a larger than expected role in the determination of prices in Mozambique, and that more research is needed to address the complex issue of affordability of medicines in low-income countries. We also argue that price controls may not be the most effective way to influence access to medicines in low-income countries, and managing demand and supply towards cheaper effective drugs appears a more suitable policy option.

Br J Nutr. 2009 Oct 12:1-8.

Food, energy and macronutrient contribution of out-of-home foods in school-going adolescents in Cotonou, Benin.

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The objective of the present study was to document the food, energy and macronutrient contribution of out-of-home prepared foods in school-going adolescents in Cotonou (Benin) and compare the food, energy and macronutrient intakes of low and high out-of-home consumers. We used a cross-sectional study with 24 h dietary recalls on two non-consecutive school days to collect food intake data. Low and high consumers were defined respectively as subjects whose percentage of daily energy intake from out-of-home foods was in the first and the third tertiles of the sample distribution.

The setting was twelve secondary schools in Cotonou with 656 adolescents aged 13-19 years. Out-of-home prepared foods contributed more than 40 % of the daily energy, fat, protein, carbohydrate and fibre intakes and of the daily weight of food in the adolescents. They were highly present at breakfast and as afternoon snacks in high consumers, providing respectively 94 and 82 % of the energy intake of high consumers at breakfast and as afternoon snacks. Low consumers ate more fruit and vegetables and cereal grain products than high consumers

whereas high consumers consumed more sweet energy-dense foods. Both categories had a diet poor in fruit and vegetables (hardly one-fourth of the recommended 400 g) and high in fat.

We concluded that out-of-home foods are important in the diet of urban school adolescents in Benin. Therefore, they should be investigated in depth and taken into account in the development of interventions to promote healthy diet and lifestyles in adolescents.

J Infect. 2009 Oct;59(4):247-51.

High prevalence of antimicrobial drug-resistant diarrheagenic *Escherichia coli* in asymptomatic children living in an urban slum.

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PURPOSE: The aim of this study was to investigate the presence of diarrheagenic *Escherichia coli* and antibiotic resistance in asymptomatic school-age children living in an area with defective environmental sanitation, comparing with children registered at a private school, both in the city of Osasco, Brazil.

METHODS: Seventy-nine school-age children between 5 and 10 years living in a slum and 35 children who attended a private school of the same city were included in the study.

RESULTS: DEC was found in 58% of the children living in the slum and in 17% of the control group ($P=0.001$). Resistance to at least one antimicrobial drug was found in 65% of DEC strains; resistant to two or more antimicrobial drugs was found in 46% of strains.

CONCLUSION: The high carriage status among the slum children point towards the widespread environment contamination in low socio-economic housing conditions, in conformance with the pediatric population at higher risk for developing DEC diarrhea.

Int J Infect Dis. 2009 Nov;13(6):668-72.

Frequency of isolation of various subtypes and antimicrobial resistance of *Shigella* from urban slums of Karachi, Pakistan.

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OBJECTIVES: Shigellosis remains a major public health problem in developing countries. Antimicrobial resistance has complicated the empirical treatment. Knowledge of serotypes is crucial in vaccine development, as cross-protection between various serotypes is limited. Therefore we conducted a prospective study to determine the frequency of isolation of *Shigella* serotypes and antimicrobial resistance.

METHODS: Stool samples from 8155 individuals, collected through a surveillance study conducted in four slums of Karachi from January 2002 to March 2004, were cultured. **RESULTS:** *Shigella* was isolated in 394 (4.8%) of 8155 patients presenting with diarrhea. Two hundred

and forty-two (62%) isolates were *Shigella flexneri*, 72 (18%) were *Shigella sonnei*, 43 (11%) were *Shigella boydii*, and 37 (9%) were *Shigella dysenteriae*. Thirteen *S. flexneri* serotypes were identified, of which the most frequent were 2a (38), 6 (37), and 1b (25), followed by 2b (23). Only 22 (5.6%) *Shigella* isolates were found to be pan-susceptible. Large proportions of isolates were resistant to co-trimoxazole (89% *S. flexneri*, 81% *S. dysenteriae*, 80% *S. sonnei*, and 56% *S. boydii*) and ampicillin (87% *S. flexneri*, 68% *S. dysenteriae*, 35% *S. boydii*, and 4% *S. sonnei*).

CONCLUSIONS: Concurrent circulation of multiple strains with high resistance is worrying and mandates surveillance at the national level to facilitate the control of shigellosis.

Urban Environmental Health

Am J Public Health. 2009 Nov; 99(11): 1982-7.

Impact of drainage networks on cholera outbreaks in Lusaka, Zambia.

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OBJECTIVES: We investigated the association between precipitation patterns and cholera outbreaks and the preventative roles of drainage networks against outbreaks in Lusaka, Zambia.

METHODS: We collected data on 6542 registered cholera patients in the 2003-2004 outbreak season and on 6045 cholera patients in the 2005-2006 season. Correlations between monthly cholera incidences and amount of precipitation were examined. The distribution pattern of the disease was analyzed by a kriging spatial analysis method. We analyzed cholera case distribution and spatiotemporal cluster by using 2590 cholera cases traced with a global positioning system in the 2005-2006 season. The association between drainage networks and cholera cases was analyzed with regression analysis.

RESULTS: Increased precipitation was associated with the occurrence of cholera outbreaks, and insufficient drainage networks were statistically associated with cholera incidences.

CONCLUSIONS: Insufficient coverage of drainage networks elevated the risk of cholera outbreaks. Integrated development is required to upgrade high-risk areas with sufficient infrastructure for a long-term cholera prevention strategy.

Maturitas. 2009 Oct 20; 64(2): 98-103.

Preventing heat-related morbidity and mortality: new approaches in a changing climate.

O'Neill MS, Carter R, Kish JK, Gronlund CJ, White-Newsome JL, Manarolla X, Zanobetti A, Schwartz JD.

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Due to global climate change, the world will, on average, experience a higher number of heat waves, and the intensity and length of these heat waves is projected to increase. Knowledge about the implications of heat exposure to human health is growing, with excess mortality and illness occurring during hot weather in diverse regions. Certain groups, including the elderly, the urban poor, and those with chronic health conditions, are at higher risk.

Preventive actions include: establishing heat wave warning systems; making cool environments available (through air conditioning or other means); public education; planting trees and other vegetation; and modifying the built environment to provide proper ventilation and use materials and colors that reduce heat build-up and optimize thermal comfort. However, to inspire local prevention activities, easily understood information about the strategies' benefits needs to be incorporated into decision tools.

Integrating heat health information into a comprehensive adaptation planning process can alert local decision-makers to extreme heat risks and provide information necessary to choose strategies that yield the largest health improvements and cost savings. Tools to enable this include web-based programs that illustrate effective methods for including heat health in comprehensive local-level adaptation planning; calculate costs and benefits of several activities; maps showing zones of high potential heat exposure and vulnerable populations in a local area; and public awareness materials and training for implementing preventive activities. A new computer-based decision tool will enable local estimates of heat-related health effects and potential savings from implementing a range of prevention strategies.

J Trop Pediatr. 2009 Nov 5.

Schistosomiasis haematobium prevalence and risk factors in a school-age population of peri-urban Lusaka, Zambia.

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Given association of the parasite *Schistosoma haematobium* with coastal and rural/agricultural populations, there is little documentation to date of infection patterns in today's rapidly urbanizing non-coastal regions. We conducted an observational study of 5-17-year-old school children (N = 1583) in peri-urban compounds of Lusaka, Zambia. Demographic information, medical history, physical examination findings and urinalysis results were recorded. Prevalence of schistosomiasis in the population was 20.72%.

Significant risk factors for infection were male gender [odds ratio (OR) 2.42], age of 9-12 years or 13-17 years (OR 3.33 and 3.26, respectively, compared with 5-8-year-olds) and single and/or double orphan status (OR 1.43). Clinical officers detected schistosomiasis with a sensitivity of 24.70% and a specificity of 98.17% after history and physical examination. These results reveal that peri-urban populations have a significant but under-recognized vulnerability to infection, and suggest that only history and physical examination are inadequate for identifying a treatment population.

Sci Total Environ. 2009 Oct 15;407(21):5429-34.

Rooftop runoff as a source of contamination: a review.

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Scientific reports concerning chemical and microbiological contaminant levels of rainwater runoff from rooftop collection in both urban and rural areas are reviewed. This alternative source of water has been documented to often contain substantial amounts of contaminants. Studies describing levels of heavy metal contamination specific to runoff from rooftop catchment areas containing exposed metal surfaces are discussed.

Depending upon the intended use, scientific evidence is also accumulating that various treatments and disinfections will be required prior to release of roof-runoff water either into surface waters or for more direct consumer usage. For microbial contamination, current proposed standards and guidelines regarding this type of water source are shown to vary widely worldwide. Scientific literature reveals a lack of clarity regarding water quality guidelines and health related standards for certain types of rooftop runoff.

Studies suggests that rainwater collection systems which are properly designed, maintained, and treated may provide a valuable supplement to existing water supplies by reducing demand on community water supplies/infrastructure costs, enhancing effective management of storm water runoff, and increasing restoration of underground reservoirs through controlled infiltration.

Urban Vector Disease

PLoS Negl Trop Dis. 2009 Nov 10;3(11):e545.

Spatial evaluation and modeling of Dengue seroprevalence and vector density in Rio de Janeiro, Brazil.

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BACKGROUND: Rio de Janeiro, Brazil, experienced a severe dengue fever epidemic in 2008. This was the worst epidemic ever, characterized by a sharp increase in case-fatality rate, mainly among younger individuals. A combination of factors, such as climate, mosquito abundance, buildup of the susceptible population, or viral evolution, could explain the severity of this epidemic. The main objective of this study is to model the spatial patterns of dengue seroprevalence in three neighborhoods with different socioeconomic profiles in Rio de Janeiro. As blood sampling coincided with the peak of dengue transmission, we were also able to identify recent dengue infections and visually relate them to *Aedes aegypti* spatial distribution abundance. We analyzed individual and spatial factors associated with seroprevalence using Generalized Additive Model (GAM).

METHODOLOGY/PRINCIPAL FINDINGS: Three neighborhoods were investigated: a central urban neighborhood, and two isolated areas characterized as a slum and a suburban area. Weekly mosquito collections started in September 2006 and continued until March 2008. In each study area, 40 adult traps and 40 egg traps were installed in a random sample of premises, and two infestation indexes calculated: mean adult density and mean egg density. Sera from individuals living in the three neighborhoods were collected before the 2008 epidemic (July through November 2007) and during the epidemic (February through April 2008). Sera were tested for DENV-reactive IgM, IgG, Nested RT-PCR, and Real Time RT-PCR. From the before-after epidemics paired data, we described seroprevalence, recent dengue infections (asymptomatic or not), and seroconversion. Recent dengue infection varied from 1.3% to 14.1% among study areas. The highest IgM seropositivity occurred in the slum, where mosquito abundance was the lowest, but household conditions were the best for promoting contact between hosts and vectors. By fitting spatial GAM we found dengue seroprevalence hotspots located at the entrances of the two isolated communities, which are commercial activity areas with high human movement. No association between recent dengue infection and household's high mosquito abundance was observed in this sample.

CONCLUSIONS/SIGNIFICANCE: This study contributes to better understanding the dynamics of dengue in Rio de Janeiro by assessing the relationship between dengue seroprevalence, recent dengue infection, and vector density. In conclusion, the variation in spatial seroprevalence patterns inside the neighborhoods, with significantly higher risk patches close to the areas with large human movement, suggests that humans may be responsible for virus inflow to small neighborhoods in Rio de Janeiro. Surveillance guidelines should be further discussed, considering these findings, particularly the spatial patterns for both human and mosquito populations.

Acta Trop. 2009 Nov 5.

Seroprevalence and risk factors for dengue infection in socioeconomically distinct areas of Recife, Brazil.

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Brazil currently accounts for the majority of dengue cases reported in the Americas, with co-circulation of DENV 1, 2 and 3. Striking variation in the epidemiological pattern of infection within cities has been observed. Therefore, investigation of dengue transmission in small areas is important to formulate control strategies. A population-based household survey was performed in three diverse socio-economic and environmental areas of Recife, a large urban center of Brazil, between 2005 and 2006. Dengue serostatus and individual- and household-level risk factors for infection were collected in residents aged between 5 and 64 years. A total of 2,833 individuals were examined, and their residences were geo-referenced. Anti-dengue IgG antibodies were measured using commercial ELISA.

The dengue seroprevalence and the force of infection were estimated in each area. Individual and household variables associated with seropositivity were assessed by multilevel models for each area. A spatial analysis was conducted to identify risk gradients of dengue seropositivity using generalized additive models (GAM). The dengue seroprevalence was 91.1%, 87.4%

74.3%, respectively, in the deprived, intermediate and high socioeconomic areas, inversely related to their socio-economic status. In the deprived area, 59% of children had already been exposed to dengue virus by the age of 5 years and the estimated force of infection was three times higher than that in the privileged area.

The risk of infection increased with age in the three areas. Working or studying outside the home area was a risk factor for seropositivity in the deprived area (OR=2.26; 95% CI: 1.18-4.30). Number of persons per room was a risk factor for seropositivity in the intermediate (OR=3.00; 95% CI: 3.21-7.37) and privileged areas (OR=1.81; 95% CI: 1.07-3.04). Living in a house, as opposed to an apartment, was a risk factor for seropositivity in the privileged area (OR=3.62; 95% CI: 2.43-5.41). The main difference between the privileged and other areas could be attributed to the much larger proportion of apartment dwellers. Intensive vector control, surveillance and community education should be considered in deprived urban areas where a high proportion of children are infected by an early age.

An Acad Bras Cienc. 2009 Dec; 81(4):655-62.

An entomological surveillance system based on open spatial information for participative dengue control.

Regis L, Souza WV, Furtado AF, Fonseca CD, Silveira JC Jr, Ribeiro PJ Jr, Melo-Santos MA, Carvalho MS, Monteiro AM.

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Aedes aegypti is a very efficient disseminator of human pathogens. This condition is the result of evolutionary adaptations to frequent haematophagy, as well as to the colonization of countless types of habitats associated with environmental and cultural factors that favor the proliferation of this mosquito in urban ecosystems. Studies using sensitive methods of monitoring demonstrate that the methods of surveillance used in the Brazilian program do not show the high degrees of the infestation of cities by this vector. To increase the capacity of the health sector, new tools are needed to the practice of surveillance, which incorporate aspects of the vector, place and human population.

We describe here the SMCP-Aedes - Monitoring System and Population Control of *Aedes aegypti*, aiming to provide an entomological surveillance framework as a basis for epidemiological surveillance of dengue. The SMCP-Aedes is upheld in the space technology information, supported by the intensive use of the web and free software to collect, store, analyze and disseminate information on the spatial-temporal distribution of the estimated density for the population of *Aedes*, based on data systematically collected with the use of ovitraps. Planned control interventions, intensified where and when indicated by the entomological surveillance, are agreed with the communities, relying on the permanent social mobilization.

Am J Trop Med Hyg. 2009 Oct; 81(4):645-50.

Effect of peridomestic environments on repeated infestation by preadult *Aedes aegypti* in urban premises in Nha Trang City, Vietnam.

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To determine the effect of peridomestic environments on *Aedes aegypti* infestation in urban premises, we conducted two consecutive surveys in the hot-dry and cool-wet seasons. Most *Ae. aegypti* pupae (79%) were recovered from premises where preadult forms (larvae and/or pupae) had been detected in both surveys. Hence, repeated infestation appears to be a useful parameter to identify premises associated with a high potential risk of dengue transmission. Multivariate analysis revealed that not only the persistent presence of containers discarded outdoors, wells, large plastic buckets, jars, and concrete toilet basins in the premises (adjusted odds ratios [aORs] = 63.3, 23.3, 22.5, 6.6, and 5.6, respectively) but also the presence of six or more residents was significantly associated with repeated infestation (aOR = 6.1). Premises with six or more residents along with specific container types from which a large number of pupae were recovered should be targeted in dengue-control programs.

Parasitol Res. 2009 Oct 17.

***Amaranthus oleracea* and *Euphorbia hirta*: natural potential larvicidal agents against the urban Indian malaria vector, *Anopheles stephensi* Liston (Diptera: Culicidae).**

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Malaria control in developing countries is based largely on vector eradication by the use of mosquito larvicides which is an ideal method for controlling mosquito and the related epidemics. On account of ecologically hazardous nature, nontarget specificity of chemical insecticides and evidences of developing resistance against them in the exposed species, currently, importance of secondary plant metabolites has been acknowledged. Insecticides of plant origin are environmentally safe, degradable, and target specific.

In view of this fact, the present work highlights the larvicidal property of extracts of *Amaranthus oleracea* and *Euphorbia hirta* against the third instar larvae of *Anopheles stephensi*, the urban malaria vector. LC(50) values for the carbon tetrachloride fraction of *A. oleracea* against larvae are 17,768.00 and 13,780.00 ppm after 24 and 48 h of exposure accordingly. For the methanol extract of the same, LC(50) values are 15,541.00 and 10,174.00 ppm after 24 and 48 h of exposure. In the case of petroleum ether extract, LC(50) values after 24 and 48 h of exposure are 848.75 and 311.50 ppm. LC(50) values for carbon tetrachloride extracts of *E. hirta* against the larvae are 11,063.00 and 10,922.00 ppm after 24 and 48 h of exposure, respectively. For methanol extract of the same extract, the LC(50) values are 19,280.00 and 18,476.00 ppm after 24 and 48 h of exposure. In the case of petroleum ether extract, LC(50) values after a 24- and 48-h exposure period are 9,693.90 and 7,752.80 ppm.

The results obtained for petroleum extracts of *A. oleracea* are encouraging and there are probabilities that the active principle contained in this extract may be more effective than its crude form and may serve as ecofriendly mosquito larvicide.

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Nutritional and socio-economic factors associated with *Plasmodium falciparum* infection in children from Equatorial Guinea: results from a nationally representative survey.

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BACKGROUND: Malaria has traditionally been a major endemic disease in Equatorial Guinea. Although parasitaemia prevalence on the insular region has been substantially reduced by vector control in the past few years, the prevalence in the mainland remains over 50% in children younger than five years. The aim of this study is to investigate the risk factors for parasitaemia and treatment seeking behaviour for febrile illness at country level, in order to provide evidence that will reinforce the EG National Malaria Control Programme.

METHODS: The study was a cross-sectional survey of children 0 to 5 years old, using a multistaged, stratified, cluster-selected sample at the national level. It included a socio-demographic, health and dietary questionnaires, anthropometric measurements, and thick and thin blood smears to determine the *Plasmodium* infection. A multivariate logistic regression model was used to determine risk factors for parasitaemia, taking into account the cluster design.

RESULTS: The overall prevalence of parasitemia was 50.9%; it was higher in rural (58.8%) compared to urban areas (44.0%, $p = 0.06$). Age was positively associated with parasitemia ($p < 0.0001$). In rural areas, risk factors included longer distance to health facilities ($p = 0.01$) and a low proportion of households with access to protected water in the community ($p = 0.02$). Having had an episode of cough in the 15 days prior to the survey was inversely related to parasitemia ($p = 0.04$). In urban areas, the risk factors were stunting ($p = 0.005$), not having taken colostrum ($p = 0.01$), and that someone in the household slept under a bed net ($p = 0.002$); maternal antimalarial medication intake during pregnancy ($p = 0.003$) and the household socio-economic status ($p = 0.0002$) were negatively associated with parasitemia. Only 55% of children with fever were taken outside their homes for care, and treatment seeking behaviour differed substantially between rural and urban populations.

CONCLUSION: Results suggest that a national programme to fight malaria in Equatorial Guinea should take into account the differences between rural and urban communities in relation to risk factors for parasitaemia and treatment seeking behaviour, integrate nutrition programmes, incorporate campaigns on the importance of early treatment, and target appropriately for bed nets to reach the under-fives.

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Pupal sampling for *Aedes aegypti* (L.) surveillance and potential stratification of dengue high-risk areas in Cambodia.

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OBJECTIVES: To identify and describe the distribution of dengue vectors and factors affecting this distribution in Cambodia, with a view to practicing rational, evidence-based dengue outbreak prevention activities.

METHODS: Entomological survey with a questionnaire component in 100 randomly selected households in each of 13 clusters of high or low human population density of seven Cambodian provinces. Entomological and other indices were calculated, and statistical methods used to describe factors of potential outbreak risk.

RESULTS: *Aedes aegypti* was the principle dengue vector in all clusters, making up 95.5% (20,555 of 21,325) of the *Aedes* pupae population. The majority of pupae were recovered either from large concrete water storage jars (16,230; 76.1%) or concrete water storage tanks (2819; 13.2%). There were small but significantly higher levels of dengue vector infestation in rural than urban areas. The mean pupae density over the survey was 16.4/house, which ranged between clusters from 5.2/house to 56.9/house. The 'pupae-per-person' index was 2.4 and 3.6 in urban and rural areas, respectively, and was independent of mean human population density or household water container distribution.

CONCLUSIONS: High populations of household-associated dengue vectors were present in all surveyed clusters. The highly skewed distribution of pupae in a limited number of key containers suggests adoption and further development of community-based control measures targeting these containers holds most potential chance of controlling dengue outbreaks in Cambodia.