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Nipah Virus Outbreak from Date Palm Juice

We investigated an outbreak of encephalitis that affected 12 persons in Basail Upazila of Tangail District, in January 2005. Eleven persons (92%) died. Serum was available from three; two had IgM antibodies against Nipah/Hendra virus by capture enzyme immunoassay. Cases were significantly more likely than controls to drink raw date palm juice (64% among cases versus 18% among controls, odds ratio [OR] 7.9, $P=0.01$). Fruit bats (*Pteropus giganteus*) are a nuisance to date palm juice collectors because the bats drink from the clay pots used to collect the juice at night. This investigation identified another route whereby Nipah virus moves from *P. giganteus* to humans in Bangladesh.

Four outbreaks of Nipah virus have been recognized in central and west Bangladesh between 2001 and 2004 (1,2,3). Each outbreak occurred between January and May. These outbreaks have been associated with different exposures. In the first outbreak in Meherpur in 2001 Nipah cases were significantly more likely to have contact with a sick cow and an ill person's secretions compared to controls (1). In the Naogaon outbreak in 2003, cases were more likely than controls to have had contact with a herd of pigs that had passed through the area prior to the outbreak (4). In Goalando in 2004, Nipah cases were significantly more likely to have climbed trees where bats may have been and to have contact with ill persons compared to controls (J Montgomery, Personal communication). In Faridpur in 2004, contact with ill persons was the primary risk for human Nipah disease (3).

P. giganteus fruit bats appear to be the wildlife reservoir for Nipah virus in Bangladesh. In the Naogaon investigation, two of 19 *P. giganteus* specimens had antibody against Nipah virus. None of 31 other animals

tested had Nipah antibodies (1). A larger animal study in Goalando also found that *P. giganteus* was the only species with antibodies to Nipah virus (Darin Carrol, personal communication).

On January 11, 2005 government health workers in Tangail District reported that eight previously healthy persons from Basail Upazila had died within the preceding week from an illness characterized by fever and mental status changes. The Institute for Epidemiology, Disease Control and Research (IEDCR) of the government of Bangladesh immediately launched an investigation, and five days later invited ICDDR,B: Centre for Health and Population Research, to assist. The objectives of the investigation were to determine the cause of the outbreak, identify risk factors for developing illness and develop strategies for prevention.

The study team defined a case of outbreak associated encephalitis as a person who lived or travelled in Habla Union, Basail Upazila, Tangail district, Bangladesh and developed fever with the new onset of seizures or altered mental status between 15 December 2004 and 31 January 2005.

An anthropology team conducted in-depth interviews with the families of each case-patient. The objectives were to explore potentially relevant exposures, to assist in framing questions for the case-control questionnaire within the context of activities, understanding and language of local residents and, because most of the cases had died, to identify appropriate proxy respondents.

Based on the findings from the in-depth study, a standardized, closed ended questionnaire was developed. Trained interviewers administered the questionnaire to each case or his/her proxy(ies). Controls were identified by visiting the next closest house to the case, confirming that no one in the house met the case definition, identifying the household resident closest in age to the case, and then seeking consent to administer the questionnaire. Proxy respondents were identified for each case-patient who had died or was unable to respond for him/herself.

Serum samples were shipped on dry ice to the Centers for Disease Control and Prevention and tested with an immunoglobulin M capture enzyme immunoassay (EIA) for detection of Nipah/Hendra IgM antibodies and an indirect EIA for Nipah/Hendra IgG antibodies.

Twelve persons met the outbreak associated encephalitis case definition. Among cases the most common accompanying symptom was unconsciousness (Table 1). Their median age was 16 years (range 5-85); seven (58%) were male. Eleven (92%) of the persons who met the case definition died. Death occurred a median of four days (range 2-9) after the first reported symptom of illness. The onset of illness for all of the cases occurred

Table 1: Symptoms of persons with outbreak associated encephalitis, Habla Union, Bangladesh, January 2005

Symptoms	Number (%)
Fever	12 (100)
Unconsciousness	9 (75)
Seizures	4 (33)
Headache	5 (42)
Vomiting	5 (42)
Difficult breathing	1 (8)
Death	11 (92)

within two weeks of each other (Figure 1).

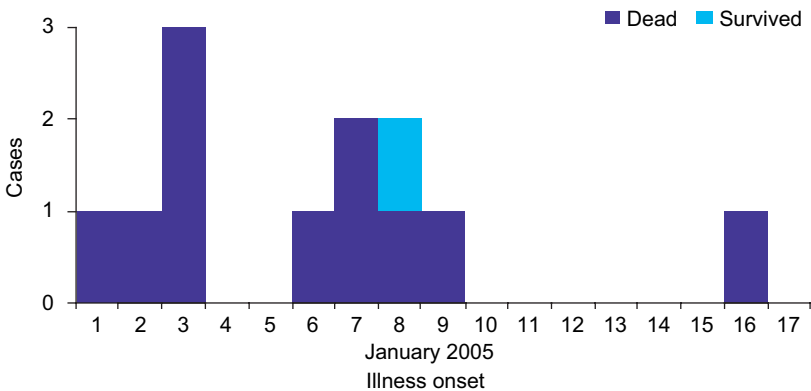
Serum was collected from three people who met the outbreak associated encephalitis case definition. Two cases had IgM antibodies against Nipah/Hendra by capture enzyme immunoassay.

Interviewers enrolled 11 cases who met the encephalitis outbreak case definition and 33 matched controls. One case was excluded because

appropriate proxy respondents with thorough knowledge of his exposures could not be identified. Proxy respondents were used for all case interviewers, and for six (17%) of control interviews.

The only exposure that was significantly associated with illness was drinking raw date palm juice (64% among cases versus 18% among controls, odds ratio [OR] 7.9, P=0.01). Of the 13 persons who reported consuming date palm juice, 11 knew from where the juice had been harvested. Ten (91%) reported that the juice was harvested from a single village.

Figure 1: Dates of Illness onset--encephalitis outbreak, Habla Union, Bangladesh.



Date palm juice collectors explained that at the outset of the season, a cut is made at the top of the tree to create an opening where the tap is placed. In the evening, a clay pot is positioned under the tap so that it can catch the dripping palm juice. Palm juice collectors climb the tree early in the morning to gather

the palm juice just before distribution. Fresh date palm juice is sold early in the morning. If it is held more than a few hours it ferments and loses its sweet taste. Date palm tree owners view fruit bats as a nuisance because the bats frequently drink the palm juice directly from the tap or the clay pot. Signs of bat excrement on the outside of the clay pot or floating in the juice are common.

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Comment

This is the fifth Nipah outbreak in five years that has been identified in the same region of Bangladesh. Each outbreak occurred between January and April. *P. giganteus* is widely distributed throughout Bangladesh (5). The reason the outbreaks are occurring in this region at this time of year may be related to increased Nipah virus shedding at the time of *P. giganteus* pregnancy and parturition and/or *P. giganteus*' attraction to particular natural or agricultural foods that are seasonally available in this region.

Date palm juice was the likely vehicle of transmission for most of the Nipah infections in this particular outbreak. Moreover, date palm juice is a biologically plausible transmission route. Drinking fresh, raw date palm juice was the sole exposure significantly associated with illness. Nipah virus is shed from the saliva and urine of bats (6). Because fresh date palm juice is sold and consumed within a few hours of collection, even a virus that does not persist long outside of its host, might be able to survive in sufficient numbers for transmission. Indeed, the majority of the outbreak could have resulted from a single contamination of one pot of date palm juice by a single *P. giganteus*.

Fresh date palm juice is a national delicacy that is enjoyed by millions of Bangladeshis each winter. Apparently, the vast majority of servings of fresh date palm juice are safe to drink. However, this investigation illustrates that at least occasionally, the juice contains a sufficient dose of Nipah virus to be fatal to humans. Further research to define how frequently this occurs is important. Persons who want to avoid ingesting Nipah from this route, should avoid drinking raw date palm juice. Low cost interventions to restrict access of fruit bats to date palm taps and pots and so make fresh date palm juice safer should be developed and evaluated.

This outbreak provides further evidence that Nipah virus infection in humans

is a seasonal disease in Bangladesh that results from interaction between *P. giganteus* fruit bats and humans. The different modes of transmission identified in outbreaks illustrate that there are several routes of viral spread to humans from fruit bats. Further investigations should continue to look for alternative routes and devise preventive strategies.

Reference

1. Hsu VP, Hossain MJ, Parashar UD, Ali MM, Ksiazek TG, Kuzmin I *et al.* Nipah virus encephalitis reemergence, Bangladesh. *Emerg Infect Dis* 2004 Dec;10(12):2082-7.
2. Nipah encephalitis outbreak over wide area of western Bangladesh, 2004. *Health Science Bull* 2004 Mar;2(1):7-11.
3. Person-to-person transmission of Nipah virus during outbreak in Faridpur District, 2004. *Health Science Bull* 2004 Jun;2(2):5-9.
4. Outbreaks of encephalitis due to Nipah/Hendra-like viruses, Western Bangladesh. *Health Science Bull* 2003 Dec;1(5):1-6.
5. Bates PJJ, Harrison D. Bats of the Indian Subcontinent. Sevenoaks: Harrison Zoological Museum, 1997.
6. Wacharapluesadee S, Lumlerdacha B, Boongird K, Wanghongsa S, Chanhome L, Rollin P *et al.* Bat Nipah virus, Thailand. *Emerg Infect Dis* 2005 Dec;11(12):1949-1951.

Effect of psychosocial stimulation on mental development and behaviour of malnourished children: a randomised control trial

Early childhood malnutrition is associated with poor mental development. Psychosocial stimulation (e.g. play) can benefit the development of such children. The Bangladesh Integrated Nutrition Programme provided nutritional support to malnourished children through community nutrition centres. Within this programme we randomly assigned 10 nutrition centres to provide psychosocial stimulation to malnourished children, and 10 centres to serve as controls. The malnourished children who received stimulation had significantly higher mental development; they were happier, friendlier, more cooperative, and more vocal. Integrating child development activities into nutrition services in Bangladesh proved to be an effective means of improving development and behaviour of malnourished children.

In Bangladesh 30% of children are born with low birth weight (<2500 grams), 48% suffer from moderate or severe undernutrition, 10% suffer from wasting, and 45% suffer from stunting (1). Many cross-sectional and longitudinal studies have demonstrated an association between early childhood malnutrition and later cognitive development and school achievement (2). A few studies of psychosocial stimulation have demonstrated improvements in malnourished children's cognition and school achievement (3,4,5); however,

such interventions have not been conducted in Bangladesh where almost half of the children are malnourished, and there is little parental appreciation of the importance of play and stimulation to improve children's development (6). The Bangladesh Government started the Bangladesh Integrated Nutrition Programme in 1995, which supplemented malnourished children with food packets. We conducted a study, nested within this project, to assess if a low cost programme to encourage psychosocial stimulation in a rural setting in Bangladesh improves children's development.

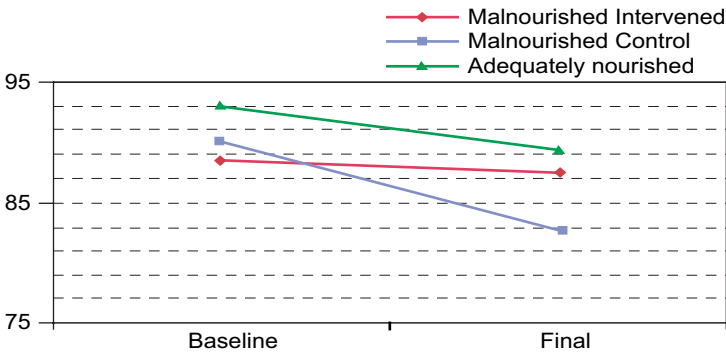
We randomly selected 20 accessible community nutrition centres; four from each of the five eligible Unions, and randomly assigned 10 nutrition centres to the intervention and 10 to control. We enrolled all malnourished children between six and 24 months of age who were attending the centres until the calculated sample size of 100 children in each group was achieved. As a second control group 100 adequately nourished children matched for age and gender were identified from the records of the nutrition centres that weighed all the children in the village. They were studied for the purpose of comparison of their developmental outcomes, but were not offered the stimulation programme.

Local women were trained as play leaders to provide stimulation to children and to assist mothers to stimulate their child. During the one-year intervention, play leaders visited each mother and child pair at their home twice-weekly for the first eight months and weekly for the next four months. The visits lasted nearly one hour. They also convened once weekly group meetings with the mothers at community nutrition centres for the first 10 months and fortnightly meetings for the next two months. Mothers were taught the importance of praising their child, chatting with and showing affection to him/her, providing opportunities for the child to play and explore, and to make learning fun. We developed an age-based curriculum using culturally appropriate low cost toys. At the beginning and end, the child's development was assessed using the revised version of Bayley Scales of Infant Development (7) that comprises mental and psychomotor development indices, and their behaviour during the test was rated using Wolk's behaviour ratings (8) including five ratings of activity, response to examiner, cooperation with test procedure, emotional response and vocalisation, each ranging from 1-9 based on the child's behaviour.

On enrollment the adequately nourished group had a higher mental development index ($p=0.06$), and a significantly higher psychomotor development index ($p<0.001$) than the malnourished children (Fig 1). There was no difference at enrollment between the two malnourished groups in any of the developmental outcomes. There were no significant differences in the behaviour ratings between any of the groups. At the end of the study, there was a decline in mental development of the children in all the groups, but the decline in the intervention group (1.8 points) was not significantly different from the baseline, whereas the control malnourished (7.4 points) and the adequately

nourished groups (3.8 points) significantly declined from the baseline (Fig. 1). The psychomotor development of all 3 groups improved but the intervened malnourished group improved by 10.1 points ($p < 0.001$) compared to a 4.7 points improvement among the adequately nourished group ($p < 0.05$) and a 3.7 points improvement among the malnourished group ($p = 0.07$) (Fig. 2). To account for the cluster design in 20 villages and the many influences on child development, we examined the treatment effect using multilevel multiple regression analyses (9) of the final scores with the two malnourished groups only. In the model, we entered initial scores, age, father's education and the treatment group. The intervention showed 4.8 points benefit on Mental Development Index ($P = 0.02$) and 3.3 points increase on Psychomotor Development Index ($P = 0.1$) compared to the control group. When controlled for nutritional status the effect of psychosocial stimulation on Psychomotor Development Index increased and approached statistical significance levels ($B = 4.2$, $se = 2.2$, $p = 0.06$).

Figure 1: Mental Development Index (MDI) in the 3 groups by the time of assessment



At baseline: $p = 0.06$ between the adequately nourished and the malnourished groups combined and not significant between the two malnourished groups.

At final: $p < 0.05$ between the control and adequately nourished groups, $p < 0.05$ between the intervened and control groups and not significant between the intervened and adequately nourished groups.

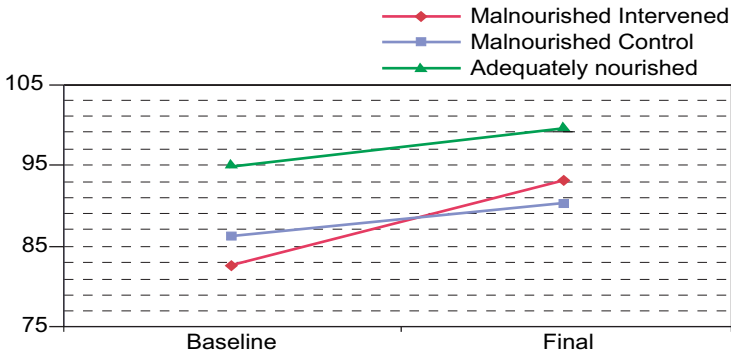
From baseline to final: $p < 0.05$ in the adequately nourished group and < 0.001 in the control group and not significant in the intervened group.

Out of the five behaviour ratings the intervention showed significant benefits on four: response to examiner i.e. friendliness ($B \pm se$, $P = 0.48 \pm 0.15$, < 0.01), emotional tone (0.31 ± 0.15 , < 0.05), cooperation (0.41 ± 0.16 , < 0.01) and vocalisation (0.45 ± 0.23 , < 0.05), but there was no effect on activity.

We then conducted a further series of multiple regression analyses to examine if the intervention and control malnourished groups were different from the adequately nourished children at the end of the study after controlling for social background differences. When compared with the adequately nourished

children at the end of the study, the control malnourished children had significantly poorer mental and motor development ($B \pm se$, $P = -5.1 \pm 2.0$, <0.05 , -6.5 ± 2.3 , <0.01 respectively), were less cooperative (-0.54 ± 0.17 , <0.01), less vocal (-0.7 ± 0.2 , <0.01) and fussier (-0.6 ± 0.16 , <0.001) than the adequately nourished children. They also tended to be less friendly (-0.3 ± 0.16 , <0.1). In contrast, the intervention malnourished children were not significantly different in any of the outcomes than the adequately nourished children except in their motor development.

Figure 2: Psychomotor Development Index (PDI) in the three groups by the time of assessment



At baseline: $p < 0.001$ between the adequately nourished and the malnourished groups combined and not significant between the two malnourished groups.

At final: $p < 0.01$ between the control and adequately nourished groups, $p = 0.1$ between the intervened and control groups, and not significant between the intervened and adequately nourished groups.

From baseline to final: $p < 0.05$ in the adequately nourished group, < 0.001 in the intervention group, and $p = 0.07$ in the control group.

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Comments

An intervention encouraging maternal psychosocial stimulation of malnourished children significantly prevented the decline in mental development of the intervention group. Though the decline was noted in all the groups, that of the intervention group was significantly lower compared to the other two groups. It is sometimes observed that poor infants living in traditional societies have high developmental scores in the first year of life as a result of a supportive environment with many adults interacting with the infant. These interactions are often reduced as the child grows and results in a decline in their development in the later years of life (10-11). This decline was also observed in the Bangladeshi study that measured developmental scores of urban Bangladeshi infants at their seven and 13 months of age (12).

Although there was a trend suggestive of a benefit in psychomotor development, it did not reach statistical significance, but when the nutritional status was controlled, the effect of the intervention on psychomotor development was stronger. It is possible that continuing poor nutritional status may explain the relatively small improvement in psychomotor development. Previous studies have also shown that stimulation mainly improves cognition and school achievement (3,4,13), and that motor development is the least affected by stimulation. Notably, four behaviour ratings also improved. The intervention children were significantly friendlier, happier, more co-operative and vocalised more often than the control malnourished children. Malnourished children are more lethargic, apathetic, and explore their environment less (2). This behaviour is known as 'functional isolation' as the children isolate themselves from the environment and, therefore, get less chance of developing their cognitive functions (14). Improving their behaviour should thus facilitate further improvement of cognition.

This study demonstrates that it is feasible to integrate child development activities into the nutrition services in Bangladesh and through that improve development of malnourished children. Future steps should include ongoing efforts to optimize these approaches, and efforts to apply the strategies on a larger scale.

References

1. United Nations Children's Fund. The state of the world's children 2005: childhood under threat. New York: United Nations Children's Fund, 2005. 151 p.
2. Grantham-McGregor S. A review of studies of the effect of severe malnutrition on mental development. *J Nutr* 1995 Aug;125(8 Suppl):2233S-2238S.
3. Walker SP, Grantham-Mcgregor SM, Powell CA, Chang SM. Effects of growth restriction in early childhood on growth, IQ, and cognition at age 11 to 12 years and the benefits of nutritional supplementation and psychosocial stimulation. *J Pediatr* 2000 Jul;137(1):36-41.
4. McKay A., McKay H. Primary school progress after preschool experience: troublesome issues in the conduct of follow-up research and findings from Cali, Colombia Study. In: King K, Meyers R, editors. Preventing school failure: the relationship between preschool and primary education: proceedings of a workshop on preschool research held in Bogota, Colombia, 26-29 May, 1981. Ottawa: International Development Research Centre, 1983:32-42.
5. Mora JO, Herrera MG, Sellers SG, Ortiz N. Nutrition, social environment and cognitive performance of disadvantaged Colombian children at three years. In: Harper AE, Davis GK, editors. Nutrition in health and disease and international development: symposia from the XII International Congress of Nutrition, San Diego, California, August 16-21, 1981. New York: A.R. Liss, 1981:403-420.

6. Hamadani JD, Hilaly A, Khatun F, Sultana P, Huda SN. Mothers' perception of children's development: findings from focus group discussions. Poster presentation at Regional Seminar on Childhood Disabilities, Dhaka, 2004.
7. Bayley N. Bayley scales of infant development. 3d ed. San Antonio, TX: The Psychological Corporation, 1993.
8. Wolke D, Skuse D, Mathisen B. Behavioral style in failure-to-thrive infants: a preliminary communication. *J Pediatr Psychol* 1990 Apr;15(2):237-54.
9. Goldstein H, Rasbash J, Plewis I, Draper D, Browne W, Yang M *et al.* *A user's guide to MLwiN*, Version 1.0. London: Institute of Education, University of London, 1998. 140 p.
10. Patel NV, Kaul KK. Behavioural development of Indian rural and urban infants in comparison to American infants. *Indian Pediatr* 1971 Sep;8(9):443-51.
11. Super CM. Behavioral development in infancy. In: Munroe RH, Munroe RL, Whiting BB, editors. *Handbook of cross-cultural human development*. New York: Garland STPM, 1981:181-270.
12. Hamadani JD, Fuchs GJ, Osendarp SJ, Khatun F, Huda SN, Grantham-McGregor SM. Randomized controlled trial of the effect of zinc supplementation on the mental development of Bangladeshi infants. *Am J Clin Nutr* 2001 Sep;74(3):381-6.
13. Black MM, Dubowitz H, Hutcheson J, Berenson-Howard J, Starr RH, Jr. A randomized clinical trial of home intervention for children with failure to thrive. *Pediatrics* 1995 Jun;95(6):807-14.
14. Levitsky DA. Malnutrition and hunger to learn. In: Levitsky DA, editor. *Malnutrition, environment and behaviour*. New York: Cornell University Press, 1979:161-179.

Sexual risk behaviour of married men and women who have lived apart due to the husbands' work migration

This study aimed to ascertain the prevalence of sexual risk behaviour among married men and women who have lived apart due to the husbands' work-migration. A cross-sectional survey was conducted among a random sample of 1,175 married women and 703 married men in two rural areas of Bangladesh. Married men who had lived apart from their wives in Bangladesh or abroad were 5-6 times more likely than those who had not lived apart to report extra-marital sex: adjusted odds ratios (AOR), 4.6 (95% CI: 2.9-7.3), and 6.0 (95% CI: 3.9-9.3), respectively. About half of the married migrant men had had sex with a sex worker while living apart from their wives in Bangladesh, or abroad. Less than one-third of these men had used a condom during extra-marital or marital sex. The sexual risk behaviour of married men living away from home puts them at risk for HIV infection, and constitutes a potential route for HIV to be introduced into Bangladesh.

Despite currently low HIV prevalence (<1%), the population in Bangladesh is vulnerable to an HIV epidemic. Cases have been found in successive rounds of sero-surveillance, among sex workers, injecting drug users, and other vulnerable populations (1). Annual behavioural surveillance has found that risk behaviour among them is at least as prevalent as in Asian countries with a concentrated epidemic. The epidemic is already advanced in neighbouring Myanmar, Nepal and parts of India (2), where HIV infection is linked with men's sexual risk behaviour, commercial sex, injecting drugs, and work mobility (3).

One of the ways HIV can be introduced into a low prevalence country is through people returning from high prevalence countries where they have engaged in risky behaviours. Data from three Voluntary Counselling and Testing Units of ICDDR,B indicate that 47 (18.1%) of the 259 people tested between 2002-2004 were HIV positive. Of these, 29 were adult males who had returned from abroad, seven were wives of migrant workers, and four were children of HIV positive migrant workers (4). In the last decade, around 200,000 Bangladeshi men were officially recorded as migrating out for work each year, mostly to the Middle East, and many more are known to leave informally (5). No previous data have been published on the association between separation from spouse and sexual risk behaviour.

This study aimed to compare sexual risk behaviour between married people who had lived apart from their spouse, and those who had not. For women, the referent group was women who had not lived apart from their husbands for at least five years; the other migration status groups were women whose husbands were living elsewhere in Bangladesh, and women whose husbands were abroad. For men, the referent group was men who had lived at home with their wives for at least five years; the other groups were men who had returned from living separately elsewhere in Bangladesh, and those who had returned from living separately abroad.

We conducted a survey among a sample of 1,175 married women and 703 husbands randomly selected from a database of over 11,000 married women in two areas where health and demographic surveillance is conducted by the ICDDR,B: Centre for Health and Population Research. Samples of each migration status group were drawn in proportion to the numbers in these groups in these areas (area A in Khulna Division; area B in Chittagong Division). Table 1 shows the number of completed interviews in each group and the percentage response, which ranged between 69-90%. Non-response was due mainly to temporary absence and sickness, and only three people refused interviews. Adjusted odds ratios (AOR; exposure/non-exposure to different factors) were calculated to compare the likelihood of sexual risk behaviour among different groups, controlling for age, length of marriage, years of schooling, household expenditure, and area of family residence.

Men who had returned from living abroad had been working in United Arab Emirates (35%), Oman (16%), Saudi Arabia (16%), Kuwait (11%), Pakistan (8%), Malaysia (6%), and India (3%). Men who had lived away from home in Bangladesh had worked in Chittagong, Dhaka or Khulna Divisions, particularly in the major port city of Chittagong (43%) and the capital, Dhaka (19%).

Table 1: Number of married women and men randomly selected for interview, completed interviews and percentage response

Migration status groups	Sample selected and currently in the correct group	Number absent/ sick (refused)	Number of completed interviews (% response)
<i>Married women (15-49 years)</i>			
Not lived apart from husband	499	98	396 (79.4%)
Husband currently away in Bangladesh	533	163 (2)	368 (69.0%)
Husband currently abroad	545	131	411 (75.4%)
<i>Husbands of married women (15-49 years)</i>			
Not lived apart from wife	521	114	407 (78.1%)
Returned from Bangladesh	154	37	117 (76.0%)
Returned from abroad	199	19 (1)	179 (89.9%)

More than half of the men who had lived away from their wives in Bangladesh (59.8% [95% CI: 50.9-68.7]), and two-thirds of those who had lived abroad (67.0% [95% CI: 60.1-73.9]) reported penetrative sex with someone other than their wives since marriage, significantly higher proportions than for men who had not lived away from their wives (25.6% [95% CI: 21.4-29.8]). Prevalence of reported extra-marital sex was similar in the two study areas (Table 2). Multiple logistic regression analysis indicated that after controlling for socio-demographic factors, men who had lived away in Bangladesh or abroad were five to six times more likely to have had extra-marital sex: AORs, 4.6 (95% CI: 2.9-7.3) and 6.0 (95% CI: 3.9-9.3), respectively.

Table 2: Extra-marital sex reported by men in two rural areas of Bangladesh, by migration status

Survey area	Percentage of men reporting extra-marital sex (95% CI)		
	Men who had not lived away (Referent)	Men who had returned from Bangladesh	Men who had returned from abroad
<i>Sex with any partner</i>	(n=201)	(n=92)	(n=164)
Area A (Chittagong Division)	27.9 (21.7-34.1)	58.7 (48.6-68.8)*	67.1 (59.9-74.3)*
	(n=206)	(n=25)	(n=15)
Area B (Khulna Division)	23.3 (17.5-29.1)	64.0 (45.2-82.8)*	66.7 (42.8-90.6)*

*Significantly higher than referent group (95% confidence intervals do not overlap)

Men were 2-3 times more likely ($p < 0.05$) to have had sex with a female sex worker while living away than before (Table 3). About half of the migrant men reported sex with a sex worker while living away, in Bangladesh (46.1% [95% CI: 37.1-55.1], or abroad (53.6% [95% CI: 46.3-60.9]. Of these men, seven (3.9%) reported sex with a sex worker after returning to Bangladesh (in the last 12 months).

Table 3: Sex with a female sex worker or another male, reported by men in two study areas combined, by migration status

Period of reported extra-marital sex	Percentage of men (95% CIs)		
	Men who had not lived away (Referent) (n=407)	Men who had returned from Bangladesh (n=117)	Men who had returned from abroad (n=179)
<i>Sex with female sex worker</i>			
Since marriage (all men)	15.2 (11.7-18.7)	49.6 (40.5-58.7)**	58.7 (51.5-65.9)**
Before living away from wife	-	13.7 (7.5-19.9)	23.9 (17.7-30.1)
While living away from wife	-	46.1 (37.1-55.1)	53.6 (46.3-60.9)
<i>Sex with any male</i>			
Since marriage (all men)	2.5 (1.0-4.0)	8.5 (3.4-13.6)*	6.1 (2.6-9.6)*
Before living away from wife	-	1.7 (0.0-4.0)	2.8 (0.4-5.2)
While living away from wife	-	7.6 (2.8-12.4)	3.9 (1.1-6.7)

* Significantly higher than the referent group ($p < 0.05$)

** Significantly higher than referent group (95% confidence interval do not overlap)

Relatively few men who had been living with their wives reported having had anal sex with another male since they married: 2.5% [95% CI: 1.0-4.0]. Significantly more of those who had lived away in Bangladesh (8.5% [CI: 3.4-13.6]), or abroad (6.1% [CI: 2.6-9.6]) reported sex with another male.

Fewer women than men reported extra-marital penetrative sex, although again the proportion was significantly higher ($p < 0.05$) among women whose husbands were living away in Bangladesh (10.6% [95% CI: 7.5-13.7]), or abroad (6.8% [95% CI: 4.4-9.2]), compared with the referent group of women who had not lived apart from their husbands (3.0% [CI: 1.3-4.7]). Multiple logistic regression indicated that women whose husbands were living away from home were about four times more likely to report extra-marital sex. This was statistically significant after controlling for socio-demographic factors: AORs 4.0 [95% CI: 2.0-7.9] for women whose husbands were living away in Bangladesh, and 3.6 [95% CI: 1.5-8.9] for women whose husbands were abroad.

The period of separation from spouse was a significant predictor of extra-marital sex, with relative risk increasing with a longer period of separation. Multiple logistic regression indicated that men who had lived apart within

Bangladesh for at least six months, or abroad for at least four years, were eight times more likely to report extra-marital sex than those who had not lived apart: AORs 8.2 [95% CI: 3.8-17.8] and 8.5 [95% CI: 4.2-16.8], respectively. Women living apart from their husbands for these periods were similarly at higher risk (Table 4).

Table 4: Length of separation from spouse: adjusted odds ratios as estimates of relative risk for extra-marital sex (any partner) by married men and women

Estimates of relative risk for extra-marital sex: Adjusted odds ratios ¹ (95% confidence interval)		
Longest period of separation	Married men returned home	Married women with husband living away
	<i>Men returned from Bangladesh</i>	<i>Husband away in Bangladesh</i>
Not lived away	1 (referent)	1 (referent)
<3 months	2.6 (1.3-5.7)*	2.4 (1.0-5.9)*
3-5 months	4.1 (2.1-8.1)*	2.7 (1.1-7.1)*
6+ months	8.2 (3.8-17.8)*	7.4 (3.4-16.2)*
	<i>Men returned from abroad</i>	<i>Husband abroad</i>
Not lived away	1 (referent)	1 (referent)
<25 months	4.1 (2.2-7.6)*	3.1 (1.0-9.3)*
25-48 months	6.7 (3.7-12.3)*	2.5 (0.9-7.8)*
>48 months	8.5 (4.2-16.8)*	6.1 (2.1-18.1)*

* Significantly raised risk based on 95% confidence interval

¹ Controlled for age, length of marriage, years of schooling, monthly household expenditure, and area of family residence

Less than one-third of men reported using a condom with their wives, with little difference between migrant and non-migrant men (28-30%). The proportion was also no higher among men who reported extra-marital sex. For men who had returned from elsewhere in Bangladesh, the proportion was lower for those who reported extra-marital sex (16.5%), than for those who did not (43.5%).

Reported by: Health Systems and Infectious Disease Division, ICDDR,B

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Comment

Although extra-marital sex by men was quite common, it was much more prevalent among migrant men who had lived apart from their wives, in Bangladesh or abroad. Women were also more likely to report extra-marital sex if their husbands were living away from home. The likelihood of extra-marital sex increased with length of separation. Comparison of reported extra-marital sex by men while living away and before living away from their wives, also indicated an association with separation. Men were more likely to have

had sex with another male while living away than before living away, and three times more likely to have had sex with a sex worker while living away than before (Table 3). The proportion of men reporting sex with a female sex worker while abroad was particularly high (53.6% [95% CI: 46.3-60.9]), and this constitutes a potential route for HIV to be introduced into Bangladesh from abroad.

HIV-infection has been found among female sex workers in Bangladesh in the national surveillance (<1%), although less is known about prevalence among sex workers in countries of the Middle East where most men from Bangladesh go to work abroad. However, the passively reported HIV cases among returning migrant men suggest that many more men may potentially be at risk for HIV and other sexually transmitted infections. The risk for wives is indicated by the low condom use reported by men, both for extra-marital and marital sex. Less than one-third of men had used a condom during sex with a sex worker, either abroad or in Bangladesh. Only about 30% of men had ever used a condom during sex with their wives, whether they had lived away from them, and whether they reported extra-marital sex, or not.

Since about half of Bangladeshi men in the two study areas reported having sex with a sex worker while living away from their wives, mostly without use of a condom, there is an urgent need to raise awareness of the risk for HIV infection, and to develop and evaluate interventions to reduce the risk among migrants.

References

1. Azim T, Rahman M, Alam MS, Chowdhury IA, Rahman M, Reza M. National HIV serological surveillance, 2004-2005, Bangladesh : sixth round technical report. Dhaka: Ministry of Health and Family Welfare, Government of Bangladesh, 2005. 47 p.
2. Kumar S. HIV cases rising sharply in India. *BMJ* 2003;327:245.
3. Joint United Nations Programme on HIV/AIDS. AIDS epidemic update: December 2003. Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS, 2003. 19-21.
4. Zaidi A, Zahiruddin M, Parvez M *et al.* Profile of HIV positive clients attending a VCT unit in Bangladesh. *In: Abstract for the 15th International AIDS Conference, Bangkok, July 2004. Bangkok. Accessed on 16 September 2004: http://www.iasociety.org/ejias/show.asp?abstract_id=2173468.*
5. Siddique T. Bangladesh. *In: United Nations Development Programme. No safety signs here: research study on migration and HIV vulnerability from seven South and North East Asian countries. New York: United Nations Development Programme, 2004: 21-42.*

Surveillance updates

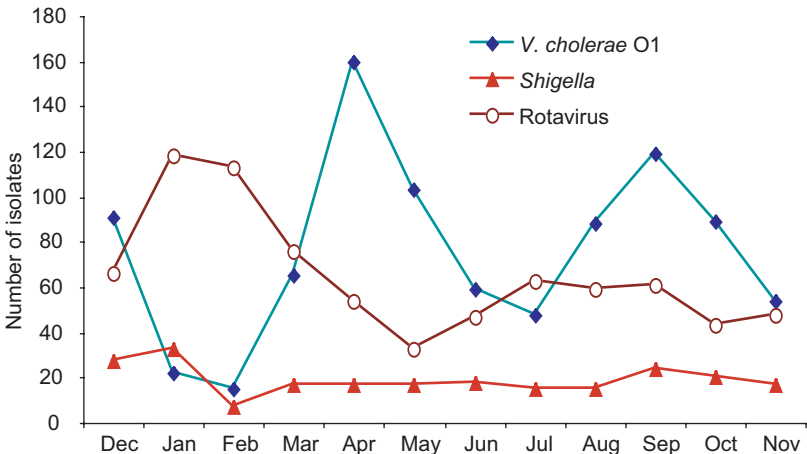
With each issue of the HSB, updates of surveillance data described in earlier issues are provided. These updated tables and figures represent the most recent observation period available at the time of publication. We hope these updates will be helpful to health professionals who are interested in current patterns of disease and drug resistance.

Proportion of diarrhoeal pathogens susceptible to antimicrobial drugs: December 2004-November 2005

Antimicrobial agent	<i>Shigella</i> (n=227)	<i>V. cholerae</i> O1 (n=913)
Nalidixic acid	40.5	NT
Mecillinam	99.5	NT
Ampicillin	56.8	NT
TMP-SMX	41.4	1.4
Ciprofloxacin	100.0	100.0
Tetracycline	NT	27.8
Erythromycin	NT	40.8
Furazolidone	NT	0.3

NT=Not Tested

Monthly isolation of V. cholerae O1, Shigella and Rotavirus: December 2004-November 2005



*Antimicrobial resistance patterns of 72 M. tuberculosis isolates:
January 2004-August 2005*

Drugs	Resistance type		Total (n=72)
	Primary (n=60)	Acquired* (n=12)	
Streptomycin	20 (33.3)	4 (33.3)	24 (33.3)
Isoniazid (INH)	9 (15.0)	3 (25.0)	12 (16.7)
Ethambutal	9 (15.0)	3 (25.0)	12 (16.7)
Rifampicin	10 (16.7)	4 (33.3)	14 (19.4)
MDR (INH+Rifampicin)	3 (5.0)	2 (16.7)	5 (6.9)
Any drug	32 (53.3)	7 (58.3)	39 (54.2)

() column percentages

* Antituberculous drugs received for 1 month or more

*Antimicrobial susceptibility of N. gonorrhoeae isolated during July-September 2005
(n=11)*

Antimicrobial agent	Susceptible (%)	Reduced susceptibility (%)	Resistant (%)
Azithromycin	100.0	0.0	0.0
Ceftriaxone	100.0	0.0	0.0
Ciprofloxacin	9.0	0.0	91.0
Penicillin	27.3	9.1	63.6
Spectinomycin	100.0	0.0	0.0
Tetracycline	0.0	0.0	100.0
Cefixime	100.0	0.0	0.0

*Antimicrobial susceptibility pattern of S. pneumoniae among children <5 years
during May-October 2005*

Antimicrobial agent	Total tested (n)	Susceptible (%)	Reduced Susceptibility (%)	Resistant (%)
Ampicillin	22	100	0	0
Cotrimoxazole	25	16	12	72
Chloramphenicol	25	100	0	0
Ceftriaxone	25	100	0	0
Ciprofloxacin	24	92	8	0
Gentamicin	25	12	0	88
Oxacillin	25	96	0	4

Source: Data obtained from children participating in PneumoADIP surveillance - a joint collaboration of ICDDR,B and Dhaka Shishu Hospital which has been conducted in Dhaka Medical College Hospital, Chittagong Medical College Hospital, Sir Salimullah Medical College Hospital, ICH-Shishu Sasthya Foundation, Chittagong Maa-Shishu O General Hospital, Dhaka Shishu Hospital, Kumudini Hospital-Mirzapur, and ICDDR,B's urban surveillance in Kamalapur, Dhaka and rural surveillance in Mirzapur, Tangail.

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Photo: A home visit showing the mother, the child and the Play Leader, looking at a picture card. (Courtesy of Jena D. Hamadani)

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