HSB
Health and Science Bulletin
VOLUME 7 • NUMBER 2 • JUNE 2009
ISSN 1729-343X

Inside

The socio-cultural consequences of long-term pregnancy related morbidities of rural women in Bangladesh

We explored the social, economic and psychological consequences of long-term pregnancy-related complications in a group of 19 women from Matlab, Bangladesh who had uterine prolapse, vesicovaginal fistula and stress incontinence. Women with fistula believed that their condition was caused by interventions used by birth attendants during labour, while those with stress incontinence and prolapse were associated with the physical consequences they experienced with heavy household chores and sexual intercourse following childbirth. Initially, most women (15 out of 19) did not consider their condition serious and thought the symptoms would gradually disappear and therefore did not seek care. Over time, their physical conditions worsened, affecting their ability to carry out daily household chores, childcare, and sexual relations, which subsequently had a negative impact on their relationships with

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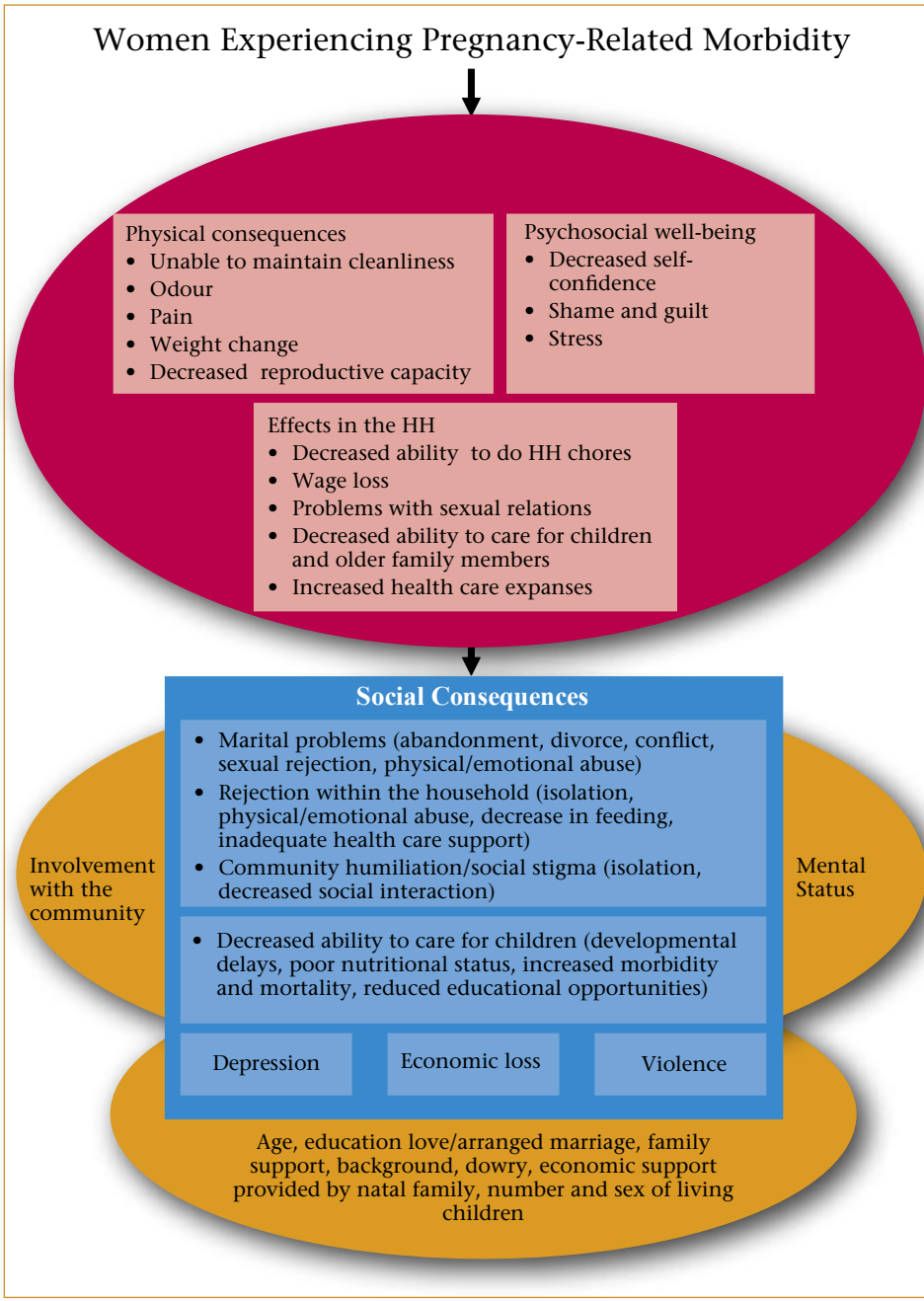
family members and the broader community. Due to the physical consequences of their pregnancy-related complications, their mobility was restricted and many became social outcasts. People in rural Bangladesh often fail to realize the severity of long term pregnancy-related complications. Future safe motherhood efforts need to include proper referral mechanisms linked to functional emergency obstetric and gynaecological care accessible to rural communities to prevent these conditions.

Maternal disabilities resulting from pregnancy-related complications affect an estimated 15-20 million women worldwide each year (1). These disabilities include severe anemia, pelvic inflammatory disease, fistula, genital prolapse, incontinence, nerve damage, pituitary failure, depression and infertility (1). Beyond these physical consequences, it is hypothesized that women who suffer from severe complications during childbirth are more likely to experience negative short- and long-term psychological, social and economic problems than women without maternal complications. Changes in social status may include spousal abandonment, marital dissolution or social isolation. Family members may also be negatively affected. For example if a woman can not perform her daily activities, or requires expensive medical treatment as a result of a disability caused by an obstetric complication, then the family could become impoverished (2-4). Additionally, changes in a woman's physical and mental health may impact her ability to provide childcare, thus affecting the well-being of her children. The following diagram shows the potential consequences of long-term conditions associated with complications experienced during childbirth, as well as factors that may influence women's ability to cope.

We collected case histories of 19 women living in Matlab who were diagnosed with vesicovaginal fistula (4 women), stress incontinence (4 women) and prolapse (11 women) to understand how these conditions affect women's daily activities, health and personal hygiene, mobility and health care seeking behaviour, and what their condition means in the broader family and social context. We also examined how social consequences vary according to the type and duration of these long-term pregnancy-related complications. Women with morbidities associated with childbirth were initially identified through the community-based health workers; subsequently, their condition was diagnosed through a physical examination carried out by physicians.

Women included in the study had been suffering from these morbidities from 8 to 25 years. The findings suggest that long-term pregnancy-related morbidities have devastating effects on women's social, physical, and



conjugal life, and these conditions also impact on their ability to provide childcare and carry out household activities. Women with a fistula believed

their condition was caused by interventions used by birth attendants, while those diagnosed with stress incontinence and prolapse attributed their condition to having carried out heavy household chores and sexual intercourse immediately following childbirth. Initially, 15 out of 19 women did not consider their condition to be serious. Nevertheless, over time, physical consequences such as the constant leaking of urine and other discharges made daily activities, including cleaning, cooking, childcare and religious rituals, difficult. One woman with a fistula said, *"In the Hindu religion, we need to take a bath before we go to the kitchen. It is not possible for me to maintain all those practices. Cleaning the room and taking a bath and then cooking is meaningless for me since I remain unclean all day long. As I am an impure person, I am not allowed to participate in any religious programme. I have been going through this mental suffering for the past 20 years."*

The condition also affected the women's conjugal relationships. Two women with fistula were divorced and one woman with uterine prolapse was divorced by one husband and abandoned by a second after developing the condition. Other women said they and their spouses experienced pain and discomfort during sexual intercourse, which according to our respondents led to a decrease in sexual relations,disagreements between the couple and violence inflicted by the husband. These physical consequences also impacted on women's mobility and social interactions, as cases suffering from fistula or stress incontinence were concerned about leaking urine in public places and finding a private place to change the napkins they must wear to absorb the urine. Women reported that community people used derogatory terms to address them such as "*mutuni*", one who urinates all the time, and "*neckra pinduni*", one who uses napkins all the time", which socially excluded them. Women with prolapsed uterus said that they remained concerned if their hanging uterus was visible to others when they sat or walked, and women also experienced shame due to the odours their secretions emitted.

All cases also reported experiencing additional physical consequences associated with these morbidities such as sores on their thighs, which in prolapse cases was caused by the uterus rubbing against the thigh, while women who were incontinent complained about rashes and infections caused by the constant usage of napkins and dripping of urine. Sleep deprivation was also a complaint of women with incontinence. One respondent said, *"I can not sleep soundly due to this problem; I search for a dry place in my bed all night and most of the time I do not find any."* Their food and water intake also changed; prolapse cases believed that their uterus would further descend if they consumed a full meal, and women with incontinence and fistulas were concerned about limiting their intake of water and certain foods thought to increase urine output.

Initially these women did not seek health care for several reasons: they did not consider it to be a serious matter; they did not know what to do and where to go; and their condition were related to a private body part, for which seeking care is considered shameful. As the condition deteriorated, women experiencing a prolapsed uterus or incontinence sought treatment with village doctors and herbalists, yet their condition remained unchanged. On the other hand, fistula cases were aware that surgery is the appropriate treatment for their condition. Although 2 of the 4 cases with fistulas had reconstructive surgery, their condition remained unchanged. All women experiencing different morbidities mentioned economic constraints as a barrier to seeking treatment. The following case study illustrates the social consequences experienced by one woman with a fistula.

Case Study

Sunita suffered from prolonged obstructed labour before the traditional birth attendant and the village doctor decided that to save her life, they needed to cut the foetus into pieces to remove it from the womb. After the delivery, Sunita noticed that she was continuously secreting some fluids. Initially she thought these were birthing fluids, but within a short time realized that she was discharging urine. Her husband was jobless, and though her father's family had money, they did not want to spend money on surgery. Due to her condition, her husband stopped sleeping with her and abandoned her after several days. Sunita seemed to understand her husband's reaction, explaining, *"What could I say since I am not well, I could not make any objection having such a morbid condition. Allah did this to me therefore I must accept……."* For the last 20 years Sunita has been living a solitary life, far from her original village. She rarely attends social gathering or ceremonies because she is embarrassed by her incontinence.

Reported by: Reproductive Health Unit, Public Health Sciences Division (PHSD), ICDDR,B

Supported by: USAID, Washington DC through Johns Hopkins School of Public Health

Comments

Only 18 percent of births in Bangladesh are assisted by medically trained providers (5). Lack of access to essential obstetric care required by pregnant women with pregnancy complications can result in both short- and long-term morbidities and mortality. Long-term consequences from conditions such as obstetric fistula, uterine prolapse and urinary stress incontinence can have devastating effects on women, leading to marital desolation, social isolation and poverty. This is particularly true in societies where the value of women is closely linked to their role as child bearers and

childcare as is the case in Bangladesh (2). Their productivity and ability to carry out routine household chores may also be affected, causing them to be viewed as a burden to the family and affecting their social status.

People in rural Matlab often failed to understand the severity of long-term pregnancy-related morbidities and did not know where to seek care for these physical problems. To avoid pregnancy-related morbidities proper referral mechanisms with functional emergency obstetric and gynaecological care need to be made accessible to rural communities. Awareness raising campaigns should be developed that promote appropriate utilization of timely treatment for physical and psychological consequences associated with these conditions.

References

1. World Health Organization. Integrated management of pregnancy and childbirth. Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice. Geneva: World Health Organization, 2003.
2. Wall L. Dead mothers and injured wives: the social context of maternal morbidity and mortality among the Hausa of Northern Nigeria. Study Family Planning 1988;29:341-59.
3. Lister UG. Vesicovaginal fistula in Zaria. *Abumed: J Med Stud Assoc ABU* 1977.
4. Murphy M. Social consequences of vesico-vaginal fistula in Northern Nigeria. *J Biosoc Sci* 1981;13:139-50.
5. National Institute of Population Research and Training. Bangladesh demographic and health survey 2004. Dhaka: Mitra and Associates, 2005.

Improving low child immunization coverage in urban slums of Dhaka, Bangladesh

We conducted a study to assess the impact of an intervention package including an extended service schedule, additional training for service providers, use of a screening tool in health facilities, and an immunization support group, implemented within the existing vaccine service delivery system, to improve the child immunization coverage in urban slums of Dhaka, Bangladesh. Ninety-nine percent of the children aged 12-23 months were fully immunized after implementation of the interventions compared to 43% before the implementation. Fully-immunized children of working mothers were dramatically improved after implementation of the interventions (99%) compared to before implementation (14%). Policy-makers should consider implementing the intervention package in all slums of Bangladesh.

Outbreaks of vaccine-preventable diseases are more common in urban slums due to their high population density and a continuous influx of new infectious agents (1). Other important reasons are in-migration of newly susceptible people and low levels of immunization coverage. One-quarter of the population of the Dhaka City Corporation (DCC), which is located within the formal boundaries of the city, lives in slum households (2).

Although 75% of children aged 12-23 months are fully immunized in Bangladesh, the coverage in urban slums remains low. A recent survey in Dhaka city found that the proportion of fully-immunized children aged 12 months living in slums was only 54% (3). Evidence suggests that lack of knowledge within the community (e.g. on the need for immunization, multiple doses, and the importance of completing the entire course) as well as irregular scheduling of the Expanded Programme on Immunization (EPI) sessions contribute to low immunization coverage in urban areas of Bangladesh (4,5). Thus, strategies are required to protect children who receive no immunizations (left-outs), those who do not complete all vaccinations before the age of 12 months (drop-outs), and those who receive vaccinations too close together or at an earlier age than is recommended (invalid doses). Experience in Benin, and Uganda suggests that with additional interventions vaccine coverage can be improved in slum communities (6,7).

Through a collaboration with the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), the Ministry of Health and Family Welfare (MOHFW), DCC and four national non-government organizations

(NGOs), a package of proven interventions was identified and implemented within the existing service delivery system without any additional budget. No additional budget was needed as providers were willing to extend their working hours voluntarily. The intervention package included:

a) **An extended EPI service schedule:** Normally, EPI services are provided from 10:00 am to 2:00 pm. In active collaboration with the DCC and participating NGOs, hours of EPI service were extended up to 5:00 pm to enable working mothers to bring their children for vaccination.

b) **Training for service providers on valid/invalid doses and management of vaccination side-effects:** Immunization experts from EPI programme of MOHFW, DCC and ICDDR,B organized a three-day refresher training for service providers and their supervisors to review valid/invalid vaccination doses and schedules and the management of side-effects. No additional budget was needed for this refresher training because the organizations normally budget and organize refresher training for vaccinators and their supervisors as needed.

c) **Use of a screening tool in health facilities:** Mothers who visited a health facility at study areas for reproductive health or child health services were asked about their children's immunization status (i.e., accompanying children and others at home) using a screening checklist. If a child required immunization, service providers administered the immunization whenever it was available. Otherwise, the child was referred to an EPI session or other vaccination centres.

d) **EPI support group:** The NGO and DCC service providers formed EPI support groups in the study areas to involve the community with the programme. The support groups consisted of house owners, mothers of children who received all recommended vaccine doses, school/college students, schoolteachers, Imams (i.e., religious leaders), local elites, and health service providers from DCC and NGOs who worked in the slums. These groups ensured that all scheduled EPI sessions were held; that children who needed vaccines were registered; assisted providers to reduce drop-outs, invalid doses, and left-outs; and organized meetings with service-providers for reviewing EPI performance.

The intervention package was implemented for 12 months during September 2006 to August 2007. This was carried out in two purposively-selected slums in a zone of the DCC area, with a predominantly slum population served by DCC and NGO EPI centres. The slums complied with the following criteria: a) unlikely to be demolished in the 12 month study period; b) the mobility of the population is limited; and c) the slums have some educational facilities. A pre-intervention survey was conducted in August 2006 and a post-intervention survey in July 2007.

Each selected slum was divided into three sub-sections (based on

geographical boundaries and roads) to facilitate sampling. From the six sub-sections within the two slums one sub-section was randomly selected from each slum for the survey. Selection of sub-sections was conducted at baseline and endline, resulting in different sub-sections for the two surveys. Within these selected two sub-sections, an enumeration was conducted in order to identify households with children aged 12-23 months. Each sub-section was designed to have approximately 2,000 households. Given that an estimated 13% of households have a child aged 12-23 months, each sub-section had approximately 260 eligible children. A sample of about 260 children from each sub-section was sufficient to assess the statistical significance of anticipated changes in immunization-coverage indicators, including 7% invalid doses, based on 95% confidence interval with 90% power. The total sample in the two sub-sections was 520 at baseline and 520 at endline.

Valid coverage was assessed in the study in terms of valid dose(s) of any antigen administered to a child by age one year. A valid dose is a recommended dose of an antigen administered at the recommended age and during the appropriate interval. Coverage of immunization was assessed for each specific antigen and for all the antigens taken together. Fully immunized, defined as vaccination with all the recommended doses of all the antigens at the recommended age and interval by age one year, was also calculated.

The coverage was assessed using the following information gathered in the survey regarding the immunization status of each of the 12-23-month old children surveyed: whether the child received any antigen; if yes, the date and dose of each antigen received; and whether or not the child received all the antigens. The information was obtained from the child's vaccination card if available. If the card was not available, information was obtained from the mother or caretaker of the child by asking how many times the child went to an EPI centre; how many injections were given to the child in each visit; and how many oral drops were given to the child during visits to an EPI centre.

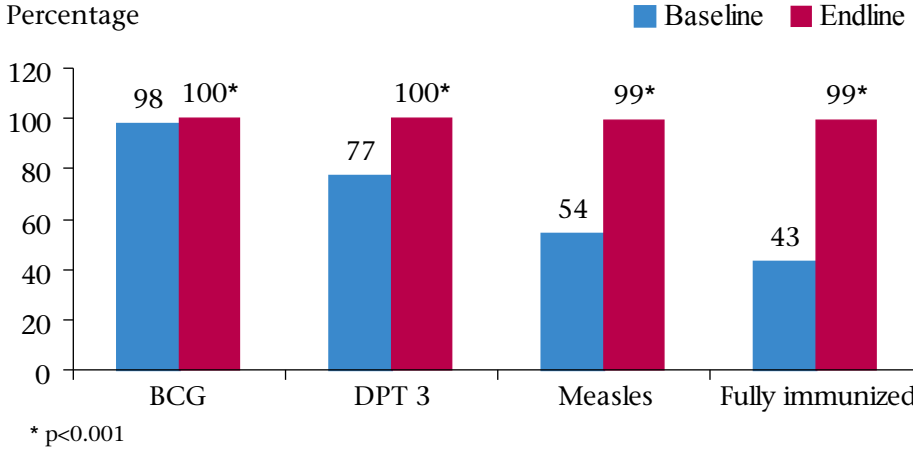
The level of valid coverage improved dramatically after the implementation of the interventions; 99% children were fully immunized (the12-23 months old children received all the valid doses of all the recommended antigens within the age of 12 months) compared to only 43% before implementation (Table 1). The drop-out rate significantly decreased from 33% to 1%. A marked reduction in invalid doses also occurred after implementation. The table shows that not a single invalid dose was found after implementation of the interventions, while 22% of children had invalid doses before implementation. The additional children fully immunized as a result of the intervention package was 874, which is 56% in the study areas.

Table 1. Valid coverage among children aged 12-23 months (card + history)

Category	Percentage of coverage		P value
	Baseline (n=529)	Endline (n=526)	
Fully immunized	43 (n=227)	99 (n=521)	<0.001
Drop-out	33 (n=175)	1 (n=5)	<0.001
Left-out	2 (n=11)	0	-
Invalid doses (card only)	22 (n=116)	0	-

Coverage was significantly higher for all antigens after implementation of the interventions (Figure 1). Although coverage of Bacille Calmette-Guérin (BCG) for tuberculosis was over 98% both before and after implementation, measles vaccine coverage was markedly lower (54%) before implementation than after implementation of the intervention (99%).

Figure 1: Percentage of children, aged 12-23 months who received specific vaccination (card + history)



At baseline, the proportion of fully-immunized children among non-working mothers was significantly higher (75%) than among working mothers (14%) (Table 2). At endline, both groups had 99% coverage, reflecting more dramatic improvement among working mothers.

Most vaccinated children received an EPI card both before and after implementation of the interventions. A slight improvement in terms of retention of cards was found after implementation of the interventions. Of the children who received an EPI card, 64% retained it before and 68% retained it after implementation.

Table 2. Status of fully-immunized children of non-working and working mothers before and after implementation of the interventions

Status of occupation	Percentage of fully-immunized children	
	Baseline	Endline
Non-working	75 (n=252)†	99 (n=284)*
Working	14 (n=277)	99 (n=242)*

*Significantly higher than baseline, P<0.001
†Significantly higher than working mothers, P<0.001

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

Supported by: The Government of Bangladesh through IHP-HNPRP

Comments

This study suggests that when the package of interventions was implemented as part of the existing EPI service delivery system, it contributed substantially to improving immunization coverage in urban slums of Dhaka.

This study evaluated the impact of a package of interventions that was implemented within the existing service delivery system using existing budgets. The NGOs, DCC and MOHFW adopted the recommended interventions into their ongoing programmes in the selected slums. Although not formally assessed, the feedback from these implementing partners suggests that these interventions could be taken up on a broader scale. In this one year pilot study, providers were willing to extend their working hours with no additional payments and to implement the screening checklist as part of their ongoing work. This required negotiation between the management and staff. Whether this could be sustained over the long term at no cost is not clear. The refresher training is a normal feature of the NGO and DCC programme that only required refocusing the training on immunization. Therefore, this intervention appears to be easily sustainable. Finally, whether or not the community support groups are sustainable is a broader issue being faced by the many health programmes implementing this model. The participants worked throughout the project period. They seemed interested to continue their involvement. Whether this could be maintained over the long term, without financial incentives to participate, would need to be assessed through a longer-term assessment, which was beyond the scope of this study.

This study showed a substantial improvement in the immunization coverage in urban slums after the implementation of a package of interventions. While we often look for a 'silver bullet' to solve problems such as inadequate EPI coverage, increasing evidence supports the need for multipronged interventions like the one tested here. Rather than

recommending particular interventions, we encourage the replication of the full package of interventions.

The results highlight the need for giving attention to special groups within marginalized populations. For example, this study highlighs the importance of addressing the needs of working mothers who are unable to attend traditional EPI services. In countries like Bangladesh, where the EPI programme has been a success nationally, targeted interventions are essential to ensure that all children benefit. Future work is needed to assess the sustainability of this package within the existing service delivery system, particularly on a broader scale.

References

1. Aaby P. The impact of measles and measles vaccinations on child survival: contradictions and regulations. *Mera* 2003 Sep;(7):6-8. (http://www.ich.ucl.ac.uk/ich/htm/academicunts/cich/pdfs/aabypaper.doc, accessed on 8 December 2004).
2. Perry H, Nurani S, Quaiyum MA, Jinnah SA, Sharma A. Barriers to immunization among women and children living in slums of Zone 3 of Dhaka city, Bangladesh: a qualitative assessment. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 2007. 36 p. (ICDDR,B working paper no. 166).
3. Bangladesh. Ministry of Health and Family Welfare. Directorate General of Health Services. Bangladesh EPI coverage evaluation survey 2007. Dhaka: Expanded Programme on Immunization, Ministry of Health and Family Welfare, Government of Bangladesh, 2007:44-105.
4. Bangladesh. Ministry of Health and Family Welfare. Directorate General of Health Services. Bangladesh EPI coverage evaluation survey 1997-2000. Dhaka: Expanded Programme on Immunization, Ministry of Health and Family Welfare, Government of Bangladesh:23-9.
5. Latson S. Immunization beliefs and coverage in Dhaka urban slums. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1993. 38 p. (ICDDR,B working paper no. 36)
6. Gbedonou P. Enlarged programme of vaccination and community participation in Benin. Benin: Government of Benin, 1999:34-9.
7. Basic Support for Institutionalizing Child Survival. Increasing immunization coverage in Uganda: the community problem solving and strategy development approach. Arlington, Virginia: Basic Support for Institutionalizing Child Survival, 2003. 4 p.

Type 2 Diabetes and prediabetic conditions among adults aged 27-50 years in Matlab: a hidden public health burden

We measured plasma glucose at fasting and two hour after 75g oral glucose challenge on 517 adults (44% male) selected randomly from the Matlab Health and Demographic Sureillance System (HDSS) database to assess the prevalence of abnormal glucose metabolism. The overall prevalence of type 2 diabetes defined as fasting glucose ≥7.0 mmol/L or ≥11.1 mmol/L 2 h after oral glucose ingestion, was 3%. Females had significantly higher prevalence of glucose abnormality including diabetes and prediabetic conditions on oral glucose tolerance test (Diabetes: 1% vs 4% and impaired glucose tolerance [IGT]: 7% vs 10%). Diabetes and prediabetic conditions exist as a significant but hidden public health problem in Matlab. Primary prevention may reduce the burden of diabetes in the community.

Diabetes is one of the most prevalent and devastating chronic non-communicable diseases having serious health, economic and social consequences (1). An emerging epidemic of diabetes is affecting more people in low income than high income countries (2). It is estimated that the number of people with diabetes globally will increase from current 171 million to 366 by 2030 (2). Diabetes and its complications place a more serious burden on individuals and families in low income countries where access to adequate treatment is poor and subsidy for treatment is generally unavailable. An ageing population, rapid urbanization with an associated more sedentary lifestyle, an altered diet high in energy dense processed foods which replaced traditional healthy diet consisting of plenty of starchy foods such as wholegrain bread, rice, some protein-rich foods and plenty of fruit and vegetables, and increased obesity are contributing to emergence of diabetes in several economies (3). People in poor settings are often exposed to undernutriton during prenatal life and born with low birth weight (4). Smaller size at birth has been shown in several studies to be associated with, higher fasting glucose concentration, impaired glucose tolerance, and development of type 2 diabetes in adult life (5). A high prevalence of low birth weight in low income countries might be one of the major determinants of the high prevalence of glucose metabolic abnormalities. Studies in various populations in Bangladesh have reported a prevalence of diabetes from 4 % to 13 % among adults with some variations by urban and rural settings (6-8). Wild *et al* estimates that Bangladesh currently has over three million people with diabetes and this number will reach 11 million by

the year 2030 (2).

While diabetes is considered a serious disease, once diagnosed healthy lifestyle and adequate clinical care can improve outcome. Prediabetic conditions (impaired fasting glucose [IFG] or impaired glucose tolerance [IGT]) are rarely recognized but they carry the same cardiovascular risk as diabetes (9). The population with prediabetic conditions is always much larger than the diabetic population, but offers an opportunity for primary prevention. Studies in Finland, the United States, and China demonstrated that diabetes can be prevented in more than half of the individuals with prediabetic conditions through interventions to modify lifestyles (10-12).

We conducted a study in rural Matlab, Bangladesh to assess the prevalence of diabetes and prediabetic conditions in relatively young adults aged 27-50 years. In total, 517 individuals (44% male) were randomly selected from Matlab Health and Demographic Surveillance System (HDSS) database. Participants were invited a day before to attend a clinic on the following morning. Clear instructions were given to the participants that they should not take any food after their last night meal which would ensure at least 8-10 h fasting when they report to the clinic. On arrival, study personnel collected venous blood for measuring fasting plasma glucose which was followed by 75 g oral glucose ingestion to perform oral glucose tolerance test (OGTT). Plasma was separated and stored on ice and transported to Dhaka for analysis of glucose concentration with autoanalyzer (Hitachi 902) by glucose oxidase/peroxidase method using a kit from Roche Diagnostics GMBH. Socioeconomic and demographic information as well as parental history, and health related questionnaires were administered and anthropometric measurements were done while the subjects were waiting for the second glucose measurement at 2 h post glucose challenge. We informed the status of glucose metabolism of the participants as soon as the results were obtained. The study was approved by the Ethical Review Committee (ERC) of ICDDR,B.

Participants were a mean 37 years old with mean body mass index (BMI) of 20 kg/m^2 (Table 1). Forty percent of man and 27% of women had BMI <18.5, meeting the definition of chronic energy deficiency. Seven percent of man and 14% of women were overweight (BMI>25 kg/m^2), however, only a few females (1.%) were obese (BMI>29 kg/m^2). Abdominal obesity, defined as waist circumference >90 cm for men and >80 cm in women, was more prevalent among women (20%) than men (6%).

The prevalence of abnormal fasting plasma glucose was comparable between men and women (Table 2). Based on only fasting plasma glucose values, 1.7% of the participants had diabetes and 11% had impaired fasting glucos (IFG). On oral glucose tolerance test 3% of the participants (1% of the males, 4% of the females) were diagnosed as diabetic. Impaired

glucose tolerance was noted among 9% of the participants (7% of men and 10% of women). Abdominal obesity was strongly associated with glucose abnormality including diabetes (Table 3). Individuals with abdominal obesity had several fold higher prevalence of diabetes, and double the prevalence of elevated fasting glucose and poor glucose tolerance. Women had a higher prevalence of abnormal oral glucose tolerance, and abdominal obsity than men. After stratifying for abdominal obesity there was no significant difference in glucose tolerance between men and women.

Table 1: Characteristics of the study participants

Characteristics	Total (n=517)	Male (n=229)	Female (n=288)
Age	37.4	37.5	37.2
Weight (kg)	49.4	52.1±9.0	47.3±8.7
Height (cm)	155.7	162.1±6.8	150.6±5.6
BMI (kg/m^2)	20.4	19.8±2.9	20.8±3.4
BMI<18.5	32.9	40.2	27.1
BMI 18.5-24.9	56.7	53.5	59.4
BMI ≥25	10.4	6.6	13.5
WC (cm)	71.1	72.1±9.2	70.2±9.5
Abdominal obesity*	13.7	6.1	19.8

*Abdominal obesity was defined as WC≥90 cm in men and ≥80 cm in women

Table 2. Glucose metabolic abnormality by sex of the participants in Matlab

Plasma glucose	Total (n=517)	Male (n=229)	Female (n=288)
Fasting			
Mean (SD)	5.0±1.2	5.0±0.9	5.0±1.3
Elevated fasting glucose (%)	10.8	10.9	10.8
Diabetes	1.7	1.7	1.7
Two hours after oral glucose load			
Mean (SD)	5.9±2.6	5.3±2.1	6.4±2.9
Impaired fasting glucose (%)	8.7	6.6	10.4
Diabetes	2.9	1.3	4.2

Table 3: Abdominal obesity and prevalence of glucose metabolic disorder

	Abdominal obesity*						p-value**
	Yes			No (n=446)			
	Total (n=71)	Male (n=14)	Female (n=57)	Total (n=446)	Male (n=215)	Female (n=231)	
Fasting plasma glucose							
Normal (<5.8 mmol/L)	74.6	64.3	77.2	89.5	88.8	90.0	
Impaired fasting glucose (IFG)(≥5.8-<7.0 mmol/L)	18.3	21.4	17.5	9.6	10.2	9.1	P=0.000
Diabetes (≥7.0 mmol/L)	7.0	14.3	5.3	0.9	0.9	0.9	
Two hours after oral glucose load							
Normal (<7.8 mmol/L)	74.6	78.6	73.7	90.6	93.0	88.3	
Impaired Tolerance (IGT)(7.8-11.1 mmol/L)	15.5	21.4	14.0	7.6	5.6	9.5	P=0.000
Diabetes (>11.1 mmol/L)	9.9	0.0	12.3	1.8	1.4	2.2	

* Abdominal obesity was defined as waist circumference ≥90 cm for males female ≥80 cm for females.

**p value for the Chi-square test between abdominal obesity "total yes" vs "total no"

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

Supported by: Department for International Development (DFID), UK

Comments

Diabetes, together with prediabetic conditions is quite common among relatively young adults in rural Matlab with women affected more than men. The observed prevalence of diabetes in this age group is consistent with other reports from Bangladesh but the prevalence of prediabetic conditions measured as impaired fasting glucose or impaired glucose tolerance is higher (8,13,14).

In this rural population women had a higher prevalence of abdominal obesity and abnormalities in glucose metabolism than men consistent with a recent rural clinic based study from Bangladesh that reported a higher prevalence of metabolic syndrome, a major factor for diabetes and cardiovascular disease, in women than men (15). By contrast a recent study in an urbanizing rural community in Bangladesh reported higher prevalence of diabetes among men than women (9.4% vs 8.0% respectively) (16).

The primary reason women in Matlab have worse glucose tolerance than men is because of their higher prevalence of abdominal obesity. Abdominal obesity is strongly associated with abnormal glucose metabolic outcomes including diabetes (17). Visceral fat is considered to be the main driving force for metabolic abnormality even in apparently lean population (18;19).

Indeed, when the analysis was controlled for abdominal obesity there was no sex difference in glucose metabolism.

Several important observations require attention. These findings clearly indicate that both undernutrition and overnutrition co-exist in this population although the problem of overnutrition is relatively lower. This study included participants who were never diagnosed or knew that they had diabetes or prediabetes. This implies that the diabetes burden that we observe probably seriously under-represent the true burden. These hidden diabetics are at greatest risk of complications and adverse outcomes. Women in our study are in their child bearing age and hence glucose abnormality has implications for child birth and neonatal survival. A recent study in Bangladesh showed higher risk of still birth and neonatal deaths among women who had gestational diabetes (20).

The best option for combating the impending diabetes epidemic in low-income countries would be to target primary prevention through promoting physical exercise, healthy diet, and maintain healthy weight and if possible enhancing early detection of glucose abnormality through population based screening built within the primary health care system. Otherwise the hidden burden of diabetic and prediabetic will have immense social and economic consequences.

References

1. International Diabetes Federation. Diabetes atlas. 3rd Edition. Brussels: International Diabetes Federation, 2006.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27:1047-53.
3. World Health Organization. Prevention and cessation of tobacco use: a manual for clinic and based interventions. New Delhi: World Health Organization, 2003
4. de OM, Blossner M, Villar J. Levels and patterns of intrauterine growth retardation in developing countries. *Eur J Clin Nutr* 1998;52:S5-15.
5. Barker DJ. The fetal origins of diseases of old age. *Eur J Clin Nutr* 1992;46:S3-S9.
6. Sayeed MA, Mahtab H, Khanam PA, Ahsan KA, Banu A, Rashid AN *et al*. Diabetes and impaired fasting glycemia in the tribes of Khagrachari hill tracts of Bangladesh. *Diabetes Care* 2004;27:1054-9.
7. Rahim MA, Vaaler S, Keramat Ali SM, Khan AK, Hussain A *et al*. Prevalence of type 2 diabetes in urban slums of Dhaka, Bangladesh. *Bangladesh Med Res Counc Bull* 2004;30:60-70.
8. Rahim MA, Hussain A, zad Khan AK, Sayeed MA, Keramat Ali SM *et al*. Rising prevalence of type 2 diabetes in rural Bangladesh: a population based study. *Diabetes Res Clin Pract* 2007;77:300-5.
9. Unwin N, Shaw J, Zimmet P, Alberti KG. Impaired glucose tolerance and impaired fasting glycaemia: the current status on definition and intervention.

Diabet Med 2002;19:708-23.

10. Tuomilehto J. Primary prevention of type 2 diabetes: lifestyle intervention works and saves money, but what should be done with smokers? *Ann Intern Med* 2005;142:381-3.
11. Li G, Zhang P, Wang J, Gregg EW, Yang W, Gong Q *et al*. The long-term effect of lifestyle interventions to prevent diabetes in the China Da Qing Diabetes Prevention Study: a 20-year follow-up study. *Lancet* 2008;371:1783-9.
12. Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA *et al* (Diabetes Prevention Program Research Group). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346:393-403.
13. Abu SM, Ali L, Hussain MZ, Rumi MA, Banu A, zad Khan AK. Effect of socioeconomic risk factors on the difference in prevalence of diabetes between rural and urban populations in Bangladesh. *Diabetes Care* 1997;20:551-5.
14. Hussain A, Rahim MA, zad Khan AK, Ali SM, Vaaler S. Type 2 diabetes in rural and urban population: diverse prevalence and associated risk factors in Bangladesh. *Diabet Med* 2005;22:931-6.
15. Zaman MM, Ahmed J, Choudhury SR, Numan SM, Islam MS, Parvin K. Prevalence of metabolic syndrome in rural Bangladeshi women. *Diabetes Care* 2006;29:1456-7.
16. Rahman MM, Rahim MA, Nahar Q. Prevalence and risk factors of type 2 diabetes in an urbanizing rural community of Bangladesh. *Bangladesh Med Res Counc Bull* 2007;33:48-54.
17. Hirani V, Zaninotto P, Primatesta P. Generalised and abdominal obesity and risk of diabetes, hypertension and hypertension-diabetes co-morbidity in England. *Public Health Nutr* 2008;11:521-7.
18. Despres JP. Is visceral obesity the cause of the metabolic syndrome? *Ann Med* 2006;38:52-63.
19. Després JP, Lemieux I, Bergeron J, Pibarot P, Mathieu P, Larose E *et al*. Abdominal obesity and the metabolic syndrome: contribution to global cardiometabolic risk. *Arterioscler Thromb Vasc Biol* 2008;28:1039-49.
20. Sayeed MA, Mahtab H, Khanam PA, Begum R, Banu A, zad Khan AK. Diabetes and hypertension in pregnancy in a rural community of Bangladesh: a population-based study. *Diabet Med* 2005;22:1267-71.

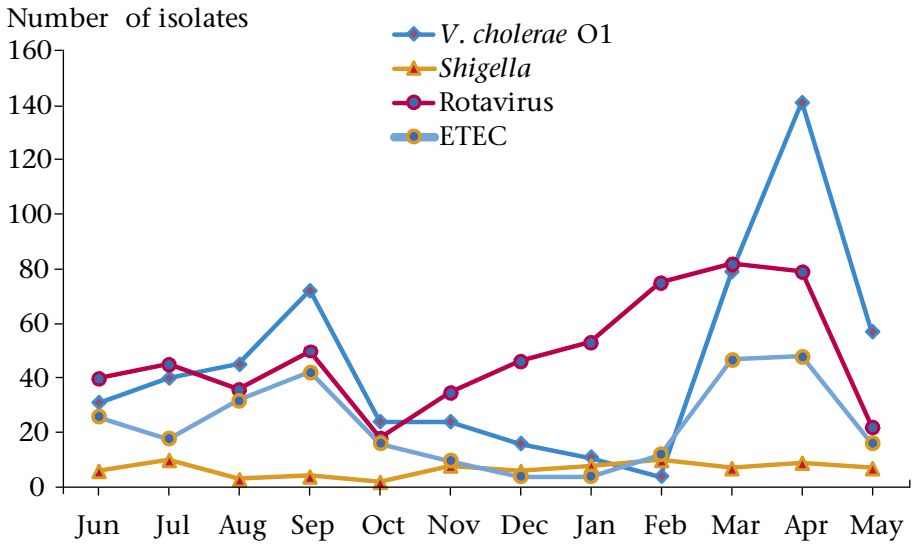
Surveillance Updates

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: June 2008-May 2009

Antimicrobial agents	*Shigella* (n=84)	*V. Cholerae* O1 (n=546)
Nalidixic acid	26.2	Not tested
Mecillinam	63.1	Not tested
Ampicillin	50.0	Not tested
TMP-SMX	27.4	1.1
Ciprofloxacin	77.4	100.0
Tetracycline	Not tested	15.4
Erythromycin	Not tested	0.0
Furazolidine	Not tested	0.0

Monthly isolation of* V. cholerae *O1,* Shigella*, Rotavirus and ETEC: June 2008-May 2009



Antimicrobial resistance patterns of 44 M. tuberculosis *isolates: March 2008-October 2008*

Drugs	Resistance type		Total (n=44)
	Primary (n=43)	Acquired* (n=1)	
Streptomycin	8 (18.6)	0 (0.0)	8 (18.2)
Isoniazid (INH)	3 (7.0)	0 (0.0)	3 (6.8)
Ethambutal	1 (2.3)	0 (0.0)	1 (2.3)
Rifampicin	0 (0.0)	0 (0.0)	0 (0.0)
MDR (INH+Rifampicin)	0 (0.0)	0 (0.0)	0 (0.0)
Any drugs	9 (20.9)	0 (0.0)	9 (20.5)

() column percentage *Antituberculous drugs received for 1 month or more

Antimicrobial susceptibility pattern of S. pneumoniae *among children <5 years during January-June 2009*

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	9	9 (100.0)	0 (0.0)	0 (0.0)
Cotrimoxazole	9	3 (33.0)	0 (0.0)	6 (67.0)
Chloramphenicol	2	2 (100.0)	0 (0.0)	0 (0.0)
Ceftriaxone	9	9 (100.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	9	8 (89.0)	1 (11.0)	0 (0.0)
Gentamicin	9	0 (0.0)	0 (0.0)	9 (100.0)
Oxacillin	7	6 (86.0)	0 (0.0)	1 (14.0)

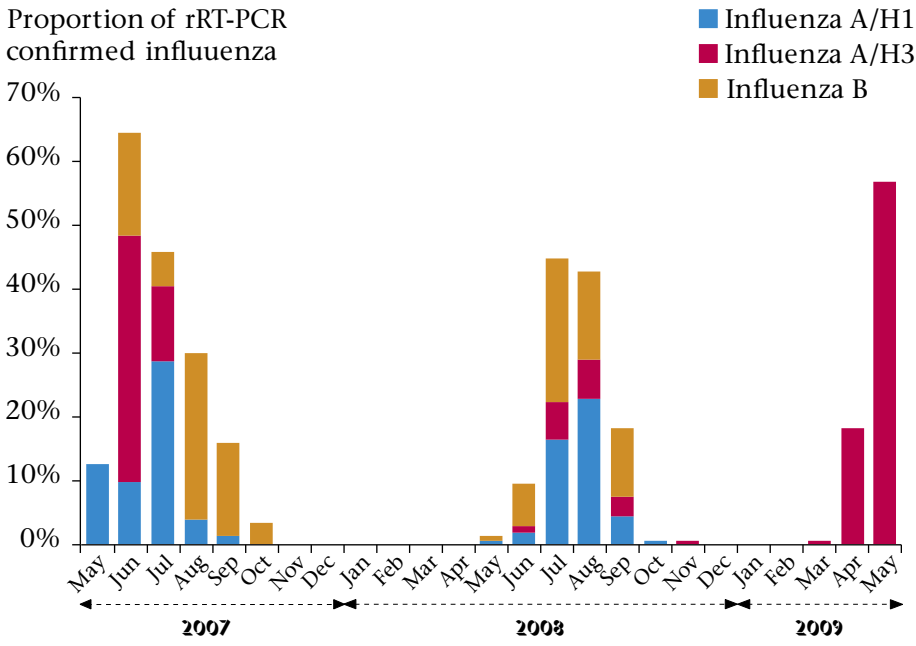
Source: ICDDR,B's urban surveillance in Kamalapur (Dhaka)

Antimicrobial susceptibility pattern of S. typhi *among children <5 years during January-June 2009*

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	46	12 (26.0)	0 (0.0)	34 (74.0)
Cotrimoxazole	46	18 (39.0)	0 (0.0)	28 (61.0)
Chloramphenicol	46	18 (39.0)	0 (0.0)	28 (61.0)
Ceftriaxone	46	46 (100.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	46	5 (11.0)	41 (89.0)	0 (0.0)
Nalidixic acid	46	5 (11.0)	0 (0.0)	41 (89.0)

Source: ICDDR,B's urban surveillance in Kamalapur (Dhaka)

Percent of influenza positive specimens by month during May 2007-May 2009



Source: Patients participating in hospital based influenza surveillance in Dhaka National Medical College Hospital, Community Based Medical College Hospital (Mymensingh), Jahurul Islam Medical College Hospital (Kishoregonj), Rajshahi Medical College Hospital, Shaheed Ziaur Rahman Medical College Hospital (Bogra), LAMB Hospital (Dinajpur), Bangabandhu Memorial Hospital (Chittagong), Comilla Medical College Hospital, Khulna Medical College Hospital, Jessore General Hospital, Jalalabad Ragib-Rabeya Medical College Hospital (Sylhet) and Sher-e-Bangla Medical College Hospital (Barisal)

A health worker is providing vaccine to a child at an our-reach centre under EPI programme

This publication of HSB is funded by ICDDR,B and its donors who provide unrestricted support for its operations and research. Currently donors providing unrestricted support include: Australian International Development Agency (AusAID), Canadian International Development Agency (CIDA), Department for International Development (DIFD), UK, Government of the People's Republic of Bangladesh (GoB), Embassy of the Kingdom of the Netherlands (EKN), Swiss Agency for Development and Cooperation (SDC) and Swedish Agency for International Development Cooperation (Sida). We gratefully acknowledge these donors for their support and commitment to ICDDR,B's research efforts.

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