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Modes of Delivery and Delivery Assistance in Rural Bangladesh

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From the Editor-in-Chief

True to the mission of *World Health & Population* (WHP), papers in this issue span the globe, from Brazil, Jamaica and Ivory Coast to Nigeria, Nepal, Bangladesh and Kerala. The two papers that directly address HIV/AIDS are those from the western hemisphere; in particular, the paper on Brazil by Wogart and Calcagnotto, from the German Overseas Institute, provides insights into the very difficult questions of the provision of antiretroviral drugs, intellectual property rights and global co-operation to address the HIV epidemic. The paper by Gibbison examines the impact of AIDS prevalence at the regional level on the consistent use of condoms as a preventative measure, emphasizing that explicit exposure to the hard facts of the epidemic is a great motivator. Finally, a paper relevant to the HIV epidemic, submitted from the Nigerian Institute of Medical Research, addresses communication between parents and children regarding sexuality. Certainly parents are seen as the "first line of defence" for sexuality-related issues, from disease prevention through population control.

Four papers in this issue are concerned with maternal and child health. Two are from Bangladesh and involve analysis of large data sets. Khan et al. work with the Bangladesh Demographic and Health Survey (DHS) data and elucidate factors associated with unintended pregnancies. Islam and Chowdhury analyze data from a large sample survey to understand the associations between normal and complicated deliveries, and the type of delivery assistance/delivery attendants utilized. Kumar, reporting from Kerala, focuses in more precisely on the issue of complicated deliveries by examining – also through sample survey data – the relationship between a woman's prenatal history and the high prevalence of Caesarean section found in that Indian state. Policy recommendations are provided in all these papers.

Koissi and Högnäs look at impacts on child mortality through a Bayesian approach, also using DHS data, this time from Ivory Coast. Their hypothesis, that the constructs around the entire family constellation must be examined in the context of potential "family frailty," is very interesting.

Finally, to round out this issue of WHP, is a practical, field-based paper on prescribing in a community-based drug program in rural western Nepal. Given the ongoing turmoil in that country, one wonders what has happened to such initiatives; however, the "lessons learned" as presented by Shankar et al. may be applicable elsewhere.

The contributing authors and editorial staff of WHP are interested in any comments or suggestions you might have on the papers or journal. Please feel free to write or e-mail us.

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Brazil's Fight Against AIDS and Its Implications for Global Health Governance

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Abstract

The paper traces Brazil's efforts to fight AIDS in the last 20 years. The analysis concentrates on the efforts to combat and prevent the deadly infectious disease through ingenious efforts of private citizens, government agencies, national and international NGOs, which challenged multinational companies, international organizations and foreign governments. While the investigation led to a positive evaluation of the joint efforts in managing the threat, it is made clear that the fight against the HIV/AIDS virus is far from over in Brazil and will have to be strengthened on the local, national and international level.

Introduction

Brazil's fight against the HIV/AIDS virus has become a cause célèbre for antiglobalists, as the country has become one of the leading developing nations to stand up against the industrialized world's trade treaties in general and the patent rights of the international pharmaceutical companies in particular. It is, however, important to separate the myth from the facts as one evaluates the current situation of the AIDS epidemic in that country and examines the efforts of the government and private sector participants to get that deadly infectious disease under control.

This paper traces the interactions, and with it the conflict and cooperative efforts of Brazilian policy-makers, with the representatives of multinational private companies and international public agencies, as well as with national and international NGOs, over the last two decades, and it assesses prospects for conflict resolution in the context of an emerging "global health governance." In the discussion on globalization and ways to "govern" that process, the above expression has been defined as structures and processes necessary to maintain basic global health standards and attempts to move toward the realization of collective goals in the health area at every level of community throughout the world.[1]

We start with a short narrative of the outbreak and expansion of AIDS in Brazil and the country's efforts to get an organized response to it. This is followed by examining the development of the pharmaceutical industry in Brazil, with particular emphasis on the role of the multinational companies in the fight against AIDS.

The analysis of the conflict over the pricing of antiretroviral medication leads directly into the interfacing of the multiple international actors in the AIDS drama, with emphasis not only on the government's but also civil society's role in bringing the major issues to the attention of the international community. We conclude with a summary and suggest a framework for studying cooperation and conflict resolution in combating AIDS not only in Brazil but also in other countries affected by the pandemic disease.

Infectious Diseases and Brazilian Government Actions

1. Infectious Diseases: Early Efforts in the Areas of Prevention and Treatment

Brazil has been able to tackle and practically eradicate polio, and it has succeeded in sharply decreasing most of the transmissible diseases, such as cholera, chagas and leprosy. Nevertheless, the country is still confronted by high rates of other transmissible diseases, whose persistence is due to factors which go beyond the health sector. One such hazard is the urban squatter settlements without accompanying infrastructure to provide power, drinking water and sewerage. Another has been caused by the expansion of agricultural frontiers through large infrastructure projects, which has caused massive migration to locations without basic health services.

It is only recently that there has been a remarkable, though not yet consistent, decline of some of those diseases. Among them are viral forms of hepatitis and tuberculosis, which have worried health authorities because of their relatively high incidence rates, their potential evolution to lethal forms and their vast geographic distribution. Some progress has been made in reducing those threats, thanks to improved TBC treatment and hepatitis B vaccination campaigns undertaken at the end of the 1990s.

Malaria and yellow fever are geographically restricted, but represent a threat in selected regions, mainly in the north and northeast of the country. After mass vaccination of 60 million inhabitants between 1998 and 2001, yellow fever's incidence has decreased rapidly, to less than 50 cases. Malaria has been under close investigation in Brazil since the late 19th century by such noted scientists as Oswaldo Cruz and Carlos Chagas. However, the containment is geographically restricted, with large-scale successes only accomplished after engaging in international cooperation exercises. In the 1950s, malaria was still endemic in 84% of the Brazilian territory. In line with the XIV World Conference on Malaria in 1955, Brazil introduced the "National Campaign to Eradicate Malaria." With those measures, the authorities were able to effectively eradicate malaria from the northeast, southeast and the south by the 1970s.

2. The Emergence and Spread of the HIV/AIDS Virus

Among the newly emergent diseases, AIDS has attracted the most attention in Brazil. Since its detection in 1980, it increased steadily until 1997, the year in which over 23,500 new cases were registered (14.8 cases/100,000 inhabitants). From 1980 to 1999, close to 120,000 people died of AIDS, and it became one of the principal death causes for the 20 to 49-year age group. By the year 2000, government agencies estimated that over 600,000 individuals between the ages of 15 and 49 were infected with the HIV/AIDS virus. By then, however, the new measures of universal treatment and prevention increased the survival rate of AIDS-afflicted adults to nearly five years as compared to barely half a year for those patients registered in the 1980s (Risi and Nogueira 2002).

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1 An example would be the Millennium Development Goals, three of which specifically aim at improving health, among which the treatment and prevention of AIDS is one. For an introduction into the issue of global health governance, see, among others: Dodgson, R. and N. Drager (2002) and Hein, W. and L. Kohlmorgen (2003).

The spread of AIDS in Brazil can be divided into three phases. The first (early 1980s) was mostly restricted to the great metropolitan centres and its transmission took place through homo- and/or bisexual relations of men. The second phase (late 1980s to early 1990s) witnessed a shift in the transmission mode through the injection of drugs and heterosexual relations, as well as an expansion to all states of the Brazilian federation, with a concentration in the larger towns with 200 to 500,000 inhabitants. The third phase (1996 to 2004 and beyond) was characterized by an increase in heterosexual transmission with a far greater number of infected women and children. The geographical spread of the epidemic has now also reached small municipalities.

The policy responses to AIDS can also be separated into a number of distinct phases (Parker 2003). The initial policy response to HIV/AIDS in Brazil occurred in 1982/83, when the first cases of AIDS were reported and initial programs were mobilized in the State of São Paulo. In 1985/86, the first nongovernmental AIDS-service organizations were founded, and a National AIDS Program was created. Contrary to the early initiatives on the part of the State Secretariat of Health in São Paulo and eleven (of 26) other state governments, that phase was characterized by widespread denial on the part of the federal government. The denial to recognize the seriousness of the disease, combined with a wave of moral panic, fear, stigma and discrimination, was captured vividly in the declarations of several religious leaders.

In the absence of leadership at the national or international levels, responses to the epidemic grew up from the ground, fostered by the representatives of affected communities, such as the emerging gay rights movement, and from the commitment of progressive health professionals and health agencies within state and local governments, who could quickly be enlisted as allies in the fight against AIDS. In the mid-1980s, community mobilization and the formation of AIDS-specific NGOs such as GAPA-São Paulo and ABIA (Rio de Janeiro), together with the pressure of a growing number of state and municipal AIDS programs, provided important incentives for the eventual response at the national level, culminating in the delayed but important implementation of a National AIDS Program in 1985 and 1986.[2]

With the establishment of the program, a second major phase of the policy response to AIDS can be traced between 1986 through 1990. At the federal governmental level, this period would be marked by a relatively pragmatic and increasingly technical approach to the epidemic. Building on previous state and local initiatives, the development of a national plan for AIDS prevention and control was conceived. However, as the implementation of the National AIDS Program proceeded during the late 1980s, a growing tendency toward centralization in Brasília led to a gradual rise in tensions among AIDS program participants at the lower levels of government.

As increasingly complex and diverse activities began to emerge in different governmental responses to the epidemic, a range of initiatives on the part of civil society began to overcome some of the widespread denial that had characterized the previous period. A larger number of nongovernmental organizations were formed throughout the country, including independent chapters of GAPA in virtually all major Brazilian cities. Those organizations played a major role in calling media attention to the epidemic as well as in placing growing pressure on governmental agencies for a more rapid and aggressive response.

Gradually, diverse religious orders as well as private and public businesses also began to address the growing impact of AIDS at the local level by developing a range of specific initiatives and services aimed at filling the previous vacuum of voluntary actions. As organizations of people living with HIV/AIDS began to form in 1989 and 1990, solidarity became the order of the day, and leaders such as Herbert Daniel emerged as key actors, not only on the national scene but at the international level as well, calling for a response to the epidemic based more on political commitment than on technocratic expertise.

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2 The Grupo de Apoio a Prevenção da AIDS (GAPA) is the oldest regionally organized NGO to prevent AIDS in Brazil. It has chapters in all major states and cities. The Associação Brasileira Interdisciplinar de AIDS (ABIAS), founded by social scientists in 1986, is aiming at mobilizing Brazilian society to confront AIDS.

A third distinct and disappointing phase can be observed in the 1990 to 1992 period. If 1990 would open with a certain sense of optimism that changes of leadership in the federal government might lead to more effective policy decisions with regard to AIDS, the experience of the two-year period in fact demonstrated the fragility of the accomplishments that had been achieved over the course of the 1980s. Virtually all of the key elements of the National AIDS Program were discontinued during the Collor administration, and a growing antagonism occurred between the National AIDS Program and virtually every other actor involved in responding to the epidemic, which precluded the possibility of collaboration or cooperation across sectors in seeking to develop more effective AIDS-related policies.

While nongovernmental and religious responses to the epidemic continued to grow, the complete lack of an effective dialogue between civil society and the federal government, together with the faltering cooperation between the National AIDS Program and state and municipal AIDS programs, made a sustainable long-term response to the epidemic difficult and called attention to the urgent need to rethink the bases of effective action not only in technical but also in political terms.

A fourth phase in the history of the policy response to the AIDS epidemic in Brazil started in 1992 with the reorganization of the National AIDS Program in the Ministry of Health. Initially, there was a concerted effort on all sides (governmental programs at every level, NGOs, universities) to work together in seeking to rebuild a national response to the epidemic. This collaborative spirit was reinforced and solidified during the process of elaborating a proposal for the first World Bank AIDS Project, at which traditional rivalries and territorial disputes were in large part set aside in favour of cooperation in fighting the disease.[3]

The spirit of collaboration was reinforced by the National AIDS Program's skilful use of national resources to support a wide range of NGO activities understood as being part of the Bank Project. Shortly after the negotiations with Bank officials, however, a range of administrative problems related to the implementation of the project overshadowed the sense of unity and common purpose that had reigned during 1993 and 1994. In addition, growing tensions between numerous activities by state and municipal AIDS programs on the one hand, and the centralized coordination of the National AIDS Program on the other, hampered further progress.

In spite of various declarations of imminent victory in the war on AIDS, it had been impossible to resolve a range of conflicting policy issues, among others, between the finance and the health ministries. Even some of the less politicized NGOs had become increasingly restless, as the Ministry of Health failed to open new calls for projects or to renew funding for already approved initiatives. The relative transparency that seemed to characterize the elaboration of the World Bank Project had given way to a general lack of transparency concerning the use of funds and the implementation of initiatives, and as the first World Bank Project began to near its conclusion, little clarity seemed to exist concerning the future of combating AIDS.

Since 1996, a new phase in the policy response to HIV/AIDS can be observed with the acquisition and distribution policy of last generation antiretroviral (ARV) drugs to be delivered for free to all AIDS patients. Together with other measures in this period, such as systematization of HIV/AIDS vigilance actions and notifications, intensified prevention, greater participation of organized civil society, and a deeper engagement for human rights, those policies and actions – also fostered by World Bank/Brazilian government joint AIDS-Projects II and III (1998–2006) – can be seen as the main factors for having "avoided 34,000 deaths and 33,000 new AIDS/HIV cases between 1994 and 1999" (Risi and Nogueira 2002). It is this period and the actions the government undertook which

3 José Serra, Minister of Health 1998–2003, has maintained somewhat dryly in an interview: "The Bank's participation was positive for it obliged us to do something well organized to make an efficient management and accounting effort" (Biehl 2004). Actually, the World Bank had financed part of the Brazilian AIDS programs already in 1988 through reallocating $6.6 million from a general loan against endemic diseases to AIDS support, funds for which were immediately available for disbursement at that time.

will require further analysis, first by looking at the development of the country's pharmaceutical sector and its international links, and then by analyzing global efforts to attack the disease.[4]

Development and Role of the Pharmaceutical Industry in Brazil's Health Sector

1. Recent Developments of Brazil's Pharmaceutical Sector

Brazil is ranked No. 11 when it comes to the output of pharmaceuticals, encompassing 550 factories and laboratories, producing 1.5 trillion units of pharmaceutical products at annual sales averaging US$5.5 billion during the early 2000s. As one of the large industrializing countries of the south, Brazil has attracted relatively early the most important pharmaceutical companies of the world to establish shop in that country, and there would seem to be a good precondition for a fair degree of competition, since none of the multinationals come even close to holding a 10% market share.[5] However, the segmentation of the various drug markets for so many different illnesses and their respective remedies, as well as the distribution and transaction system of the industry together with a tight patent system of protection, makes the market determining forces of supply and demand less reliable than in any other industry. As a consequence, the rather strong concentration in the many high-priced niche markets follows the pattern found in the fully industrialized countries, which have required government intervention of one sort or another (Wogart 2004).

The interaction between the pharmaceutical multinationals and the Brazilian government as well as the various other actors of the national health sector has been long and arduous. In a country with an endemic inflation between 10% and 100% or more, the authorities have especially been concerned about the pricing of essential goods, of which medicines are considered to be one. Until the end of the 1980s, the industry was heavily protected from imports and subjugated to price controls, which required a lot of negotiations for the firms, forcing them to clearly prove whatever price increases they maintained were based on exogenous cost increases. When inflation abated in the 1990s, that pattern was substituted by a more congenial type of price agreements between the relevant governmental agencies and the industry.

During the times of accelerated inflation, the industry made "operational" losses, some of which were caused by an accountant device called transfer pricing. That situation changed quite dramatically when the government stabilized the currency and liberalized the market for drugs in the mid-1990s. Sales more than doubled, driven mainly by price increases and less by the volume produced and sold, which rose by only 20% between 1991 and 1996 and then remained at that level in the early years of this decade.[6]

There is no doubt that Brazil's renewed external crisis in 1998/99, its devaluation, and with it the slowdown in economic growth, are at least partly responsible for the modest advancement of the industry's sales volume. However, it also stands to reason that the price increases during the 1990s caused consumers and patients to scale back on their purchases. What is clear is that the operational profitability of the pharmaceutical companies improved considerably during that decade, from a negative rate of return to equity of 5% in 1990/91 to over 20% in the mid-1990s and to over 15% in the late 1990s. Compared to all other industrial branches in Brazil, the pharmaceuticals were the most profitable during the decade, a pattern similar to the superior profitability of that industry in developed economies in general and the United States in particular during that period of time (Palmeira/Pan 2003).

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4 The latter part of the 1990s also saw the full implementation of Brazil's major health reform, which distributed a significant amount of finances and responsibilities to the states and municipalities. See Finkelman (2002).

5 Among the more important ones are Novartis (6.5%), Roche (6.0%), Aventis (5.65%), Bristol-Myers Squibb (5%), Hoechst Marion Roussel (5%), Pfizer (4.7%), and Ache (4.5%), the only national company among the big ones; see www.tradeport.org/ts/countries/brazil/isa: Brazil – The Pharmaceutical Industry, November 2003

6 Data from the annual reports of the Brazilian pharmaceutical industry's associations ABIFARMA and SINDUSFARMA.

2. The Public Sector's Involvement in the Pharmaceutical Industry

In accordance with the Constitution, Brazil's federal and state governments have created public laboratories to supply drugs for basic healthcare and for some strategic health programs such as the programs against AIDS, malaria and TBC. In the context of macroeconomic structural adjustments programs during the 1980s and 1990s, however, all government agencies had to pursue increasingly stringent market guidelines, which also included the management and finance of public pharmaceutical laboratories. Those policies were sharply criticized by members of the Parliamentary Inquiry Commission on the Pharmaceutical Industry, which rejected the idea of considering drugs more of a merchandise than a "necessary public good" (Brazil, CPI 2000).

In spite of the politicians' criticism and the concerns for improving public health through cheaply produced medications, necessary investments for the improvement and expansion of the public laboratories have not taken place until very recently. As a consequence, the situation of the public laboratories has deteriorated, with the exception of the Fundação para o Remédio Popular (FURP), related to the health ministry of the State São Paulo, and the Farmanguinhos, a production unit of the Fundação Oswaldo Cruz (FIOCRUZ) related to the federal health ministry, operating in Rio de Janeiro. Those two public drug producers have been responsible for about 60% of the sales value of the eight public laboratories in the last few years.

While the public enterprises' share in the market for prescription and over-the-counter drugs has not surpassed 10% of total sales in recent years, within the segment of strategic drugs this share is estimated to be close to 60%. That amount, however, still seems to be insufficient for satisfying the demands of the poorer population. The volume of drugs produced by the public sector firms against hypertension and diabetes are a case in point. Between October 1997 and September 1998, the public labs sold about a fifth of the 620 million units coming from the private pharmaceutical firms. The CPI has estimated that only 44% of the potential patients requiring the medication have full access to these drugs. Even for essential health drugs, the people without access are estimated to reach 40% of the actual purchasers. Following up on those deficiencies, the above cited commission drew the conclusion to rapidly increase the capabilities of public laboratories to produce drugs for the poor.

In addition to not being able to supply sufficient amounts of necessary drugs for the poorer segments of the population, another concern is quality problems of the public labs, as they aim at incorporating the necessary equipment and personnel for developing technologies of drugs that are still protected by patents but are to run out soon. This is also important in the context of WTO negotiations on compulsory licensing for purposes of dealing with national emergencies. The Foundation Oswaldo Cruz in Rio de Janeiro has developed some ARV drugs in support of Brazilian negotiations within the World Trade Organization (WTO), and its laboratories, Farmanguinhos, are currently active in the production of two drugs of the ARV cocktail not yet produced as generics anywhere else in Brazil.

In that context, the federal health ministry established a "Modernisation Program of Public Drug Production" in 2003/04 to overcome the insufficient capital formation of public drug producers. The modernization program has been directed toward six of the above-mentioned eight public laboratories, with its value amounting to a modest US$26 million. In a first step, it is intended to support the production of four drugs against hypertension and diabetes, as well as increasing the production of anti-AIDS drugs. In the follow-up action, the program entails more labs, more drugs, technological development and quality reinforcement (Palmeira/Pan 2003).

3. The Fight for Price Reductions of ARV Drugs between Brazil and the MNCs

Disputes between Brazilian drug companies and – more importantly – the Brazilian government against the Western-based multinational pharmaceutical enterprises and their respective governments have been going on for decades. As stated above, the major issue was the problem of price adjustments in an economy plagued by inflation and frequent devaluation. That was mainly a domestic issue, which was resolved on location; i.e., with the local representatives of the MNCs. The situation changed, however, when the US Pharmaceutical Manufacturers Association filed

a petition with the US government in 1987, citing Brazil's lack of process and patent protection for pharmaceutical products as an example of unreasonable practice that burdens and restricts US commerce. Since the responsible organization for bilateral trade negotiations is the Office of the United States Trade Representative (USTR), that agency initiated an investigation and requested consultations with Brazil.

Discussions with the Brazilian government were held in early and mid-1988 but did not result in any agreement on the basic issues of patent rights. Immediately afterwards, the president of the United States determined Brazil's policy to be unreasonable and a burden and restriction on US commerce, and he directed USTR to hold public hearings on certain Brazilian export products which would be singled out for additional US import duties. Shortly after that, the president used Section 301 of the Foreign Trade Act and raised tariffs up to 100% for a number of Brazilian paper products, nonbenzenoid drugs, and consumer electronic items.

In 1990, Brazil's president decided to seek and implement legislation which would provide patent protection for pharmaceutical products. That action in turn led the USTR to terminate the tariff measures, but the agency also announced that it would closely monitor Brazil's efforts to pursue and enact the relevant legislation. When Brazil passed a patent law in 1996, it was praised by both the MNCs and the US government. The latter's Information Services commented in the following way: "Previously, Brazil had argued that condoning pharmaceutical patent piracy was necessary to provide affordable medicines for its poorer citizens, but it had come now to a point of view that the country would fare better by modernizing its economy to conform to international standards" (Mossinghoff 2000).

As a consequence of the Brazilian patent law, which was not only enacted a number of years before the WTO had set a deadline, but also seemed to be tougher than prescribed by the International Organization, the major multinational companies responded with a great number of investment plans and commitments for both manufacturing and R & D centres. Just as that new wave of foreign investment was to realize, however, the ongoing trade dispute between Brazil and the United States, which had been revolving earlier around such issues as dumping of steel, soy and other Brazilian export products, started again to concentrate on the intellectual property rights regime of Brazil.

The 2001 release of the USTR Section 301 Report was especially concerned about Article 68 of Brazil's Industrial Property Law, which proposed local production on patented products within three years of patent approval. In case the patent holder did not comply, the government was entitled to override the patent and allow third-party manufacturing of the product. The specific challenge had come in that case from the Brazilian government and an Indian pharmaceutical company which was willing and able to sell a triple-therapy cocktail of anti-AIDS generic drugs to Brazil at a fraction of the price the MNCs were charging.

The USTR-chief, Zoellick, made clear that the American and international concerns were not directed against Brazilian public health policies, but rather to make sure that property rights in general were not infringed upon by national protectionist policies. Those policies were indeed violating Article 27.1 of the WTO's Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS). Brazilian policy-makers, on the other hand, maintained that Article 68 was an integral component of the country's comprehensive anti-HIV/AIDS policy. The way out of the dilemma was that Brazil had another possibility to require "compulsory licensing" of antiretroviral drugs under Article 71 of its patent law, authorizing that type of action in case of a national health emergency. It was consistent with TRIPS, which defines compulsory licensing as a WTO-compatible measure whereby governments can permit the domestic use of a patent without the consent of the patent holder in the type of emergency cases exemplified by the fight against HIV/AIDS.

On June 25, 2001, the US withdrew its WTO complaint against Brazil concerning the local manufacturing of drugs. Instead, it was decided to negotiate that and other disputes through bilateral consultative means. Brazil in turn agreed to notify the US government in advance if it found it necessary to issue a compulsory license under Article 68 of its Patent Law.

Confrontation turned into cooperation two years later, when President Bush agreed with

Brazil's President Lula to jointly assist the two Portuguese-speaking African countries of Angola and Mozambique in combating AIDS. The program is part and parcel of the US government's effort to make a concentrated effort to fight AIDS in the hardest hit countries of Africa and the Caribbean in the context of the recently approved five-year $15 billion President's Emergency Plan for AIDS Relief (PEPFAR).

With Brazil's accomplishment in carrying out a seemingly successful AIDS program at home and previous cultural and external assistance links with those two nations, it is expected to oversee most of the features of this specific assistance program. One detail will be the transfer of technical knowledge to manufacture generic antiretrovirals and helping to oversee their use in countries whose population lacks adequate healthcare.

Critics have maintained that the Brazilian model cannot be transferred to countries the per capita income of which are still extremely low, as are all the important social indicators, from doctor/patient ratios to functioning hospitals and supportive health personnel (Roger 2003). That certainly seems to be true in the two large Portuguese-speaking African nations.[7] The critical assessment is shared by Brazil's policy-makers, who have decided to concentrate first on some of the smaller African countries such as the Cape Verde Islands and Guinea-Bissau. The Brazilian coordinator of the anti-AIDS initiative has also maintained that foreign support can only provide one input. At the end of the day, it is up to the governments of each country to get seriously involved. He may have added that even in Brazil, the national government needed a long time before it took the reins in battling the HIV/AIDS virus wholeheartedly. It's the people and the strength and resources and wits of civil society in general, and NGOs in particular, that have been able to play such an important part in taking the AIDS campaign to the forefront in Brazil.

The combination of drugs necessary to alleviate AIDS consists mainly of patented products, for which the respective pharmaceutical companies could and did charge monopoly prices. As a consequence, the Brazilian authorities had negotiated with a number of MNCs for some time. One of the first confrontations took place with Roche. After a number of unsuccessful negotiations, the Brazilian health minister announced in August 2001 that his government would issue a compulsory licence for the production of the antiretroviral drug Nelfinavir (sold under the brand name Viracept by Roche) to a Brazilian manufacturer. Negotiations were resumed and Roche agreed to lower its prices by 40% (Roche Press Release 2001).

Since then, similar negotiations under the threat of a compulsory licence have taken place and have been leading to substantial price cuts of other antiretroviral drugs, such as Lopinavir and Efavirenz, as well as an antihepatitis C drug, pegylated interferon. The mood has gone from open conflict to pragmatic negotiations between the multinational pharmaceutical companies and their associations and the Brazilian health authorities. The same can be said of negotiations with the governments of the OECD countries (mainly the US). However, the US and most other governments of the OECD want to have a clear line drawn between the issuing of compulsory licences for medicines of life-threatening infectious diseases and the ones for other patented drugs.

The dialogue among the major contestants has not limited itself to exchanging legal opinions and issuing threats, but has also taken place at more civilized levels, both formally and informally. In addition to discussion with international organizations and the governments in Washington and Brasília, there were among others Brazil's resolution of promoting access to pharmaceuticals at the UN Commission on Human Rights, which was passed by a 52–0 vote and one abstention on April 23, 2001, and there were numerous open forums, where senior representatives of the WTO, the Brazilian government, the MNCs, and the NGOs discussed the major issues of how to balance the need to encourage innovation on the one hand and provide low-cost medication for life-threatening diseases on the other.

7 More importantly, in other countries of the continent, many government officials are still not quite ready to realize the danger of the current epidemic sweeping the continent. It took South Africa over five years to start to react in a serious way, and Nigeria is still taxing imported AIDS drugs at 20%.

HIV/AIDS and the Search for Effective Medication and Mediation in the International Arena

1. Curbing AIDS and the Other Infectious Diseases Internationally

According to estimates of the World Health Organization, infectious diseases (IDs) are responsible for the deaths of over 14 million people every year, with the vast majority of them occurring in the poorest developing and transition economies. The causes are manifold and range from poor sanitary conditions to poor nutrition, from lack of doctors, nurses, and hospitals to lack of financial resources to buy medical equipment and drugs.

In the WHO report on "Macroeconomics and Health," the authors identified three types of diseases affecting developing and fully industrialized countries differently, ranging from measles and hepatitis over tuberculosis and AIDS to sleeping sickness and river blindness (Sachs et al. 2001). While the first category has been present in almost all countries of the world, the second includes those infectious diseases which have had the most devastating effects on the working poor in the developing countries. The third type of diseases are exclusively to be found in the south; i.e., mostly in the poorest developing economies of Africa and Asia.

Since the introduction of antibiotics, it seemed that most of the infectious diseases could be brought under control within a few decades. As a consequence, R & D for medicines fighting those and other diseases mainly occurring in the developing countries became less important for pharmaceutical research and have been largely neglected by the major companies.

Two events changed that situation in a fundamental way. First, it turned out that some new strains of TB and other infections became resistant to antibiotics, requiring renewed research into medicines which would be able to fight those tougher bacteria and viruses. Secondly, the rise of the HIV/AIDS virus and its rapid expansion around the world led to multiple efforts to fight it. While the results until today have not yet produced one medicine which can really overcome the HIV/AIDS virus, a cocktail of various drugs have made it possible to soften the impact of the immune weakness and prolong lives for a number of years.

Those drugs were coming out of the research labs of the large international pharmaceutical corporations and were duly patented in the 1970s and 1980s. The first government that challenged the MNCs and their allies was the South African one, whose 1997 Medicines Act was sharply criticized by both the US authorities and the European Commission. When it was then challenged by the large pharmaceuticals in international courts, public outrage and pressure rose to a level which forced the MNCs to reconsider their accusations and finally back down in April of 2001.

As demonstrated above, the issue became even more dramatic in the case of Brazil against the MNCs and the US government in the case of two of the 12 antiretrovirals required by Brazil to effectively treat HIV/AIDS patients. Since the Brazilian government provided the treatments free of charge to every patient in need, the case for lowering the costs of the medicines had become urgent. Had it not been for the price reductions, and with it cutting the treatment costs per person by 70%, the country's health service agencies would not have been able to treat up to three times the patients in 1999 they had been able to during the early and mid-1990s (Neves Motta 2003).

2. The Doha Agreements and TRIPS

As a child of the General Agreements of Tariffs and Trade (GATT), the World Trade Organization (WTO) has been concentrating on reducing the barriers to trade of goods and services, with an emphasis on liberalizing world trade of goods during the early years of its existence. Despite successful efforts by GATT to reduce tariff and nontariff barriers, there have been plenty of distortions constraining trade of almost all agricultural products, which are still highly protected in most OECD countries, the governments of which have also imposed import quotas for a number of industrial products, most notably in the textiles and clothing industries.

The discussions on the economics of the member countries' service sectors became an important topic when the OECD countries looked for a bargaining tool, compensating for their willingness to finally lower their agricultural subsidies, protectionist barriers and other (for example, health-related)

restrictions. In that context the Agreement on Trade-related Aspects of Intellectual Property Rights in 1994 arose, which made members of the WTO agree not only to respect the intellectual property rights of patented products, but also to enact compatible legislation and to build up institutions which would enforce the enacted laws.

Besides the computer and entertainment industry, the pharmaceutical companies had long been fighting for that kind of legislation, since some of the emerging market economies had started to build up their own pharmaceutical industries without paying too much attention to the laws and regulations quite often differently prescribed by their own governments. As late as 1986, over 50 countries were not granting patents on pharmaceutical products at all, including quite a number of fully industrialized economies in Europe (UNCTAD 1996).

While the patents on the more profitable drugs alleviating arthritis, heart failure and lung cancer had been of a far lesser concern and demand in the poorer countries than they were in the advanced ones, the international pharmaceutical companies had realized that middle-income countries and the growing middle classes in the large poor countries like India and China were also increasingly demanding medication treating the same major illnesses facing their counterparts in the north. As a consequence, the US pharmaceuticals pressured their government to build strong (TRIPS plus) intellectual property rights into bilateral international trade treaties, which have been negotiated and implemented in a number of developing countries since the mid-1990s.

A major international reaction was voiced in 2001, when the Commission on Intellectual Property Rights was installed by the then British Secretary of State for International Development to report on Integrating Intellectual Property Rights and Development Policy. That Commission came out with a warning, asking developed countries "to consider the available evidence, imperfect as it is, before further extending IP rights." While the Commission agreed that IP protection of some kind would be appropriate at some stage for developing countries, it maintained that "too often the interests of the producer dominate in the evolution of IP policy, and those of the ultimate consumer are either not heard or heeded" (Commission on Intellectual Property Rights 2002, p.3).

Those concerns were also raised by several developing countries, including Brazil and many African governments, stressing the need to support public health needs in the patent issues. The issue at stake was the access to existing drugs and the creation of new ones. On November 14, 2001, the WTO adopted a separate declaration on TRIPS and public health, which opened the way for member countries to fully use the built-in flexibility of TRIPS, including compulsory licensing and parallel importing. At the same time, least developed countries were allowed to delay the introduction and implementation of patent legislation until 2016.

On August 30, 2003, WTO members laid down some further clarifications with regards to pharmaceutical patents and the type of exceptions which were justified under the TRIPS agreement. Among others, the 2003 Doha Declaration has made it possible for nonproducing countries to import pharmaceuticals by issuing compulsory licences. Under the so-called "Bolar" provision, some countries can allow manufacturers of generic drugs to use the patented inventions in order to obtain marketing approval from public health authorities without the patent owner's permission and before the patent protection expires, making it possible for the firm to start producing the drug right after expiration of the patent (Article 30).

Putting the claim into socially responsible language, the idea was to strike a balance "between the long-term social objectives of providing incentives for future invention and creation, and the short-term objective allowing people to use existing inventions and creations" (WTO Fact Sheet 2003). That philosophy is expected to work in the following ways:

- On the one hand, protection of inventions for a fixed period of time should not only give the innovator a reasonable return on a risky investment, but also eventually bring "social" or "external" benefits by providing other researchers to study and improve on the invention and supply society with a constant stream of new innovations and products which will save lives.
- On the other hand, the TRIPS agreement was to provide flexibility for governments to make

exceptions to patent holder rights in cases of emergency, anticompetitive practices, or if the right holder did not supply the invention. As the Doha Declaration states in Article 5c: "National governments have the right to determine what constitutes a national emergency or other circumstances of extreme urgency, it being understood that public health crises, including those related to HIV/AIDS, tuberculosis, malaria and other epidemics, can represent a national emergency or other circumstances of extreme urgency."

In short, it would seem that the TRIPS agreement and its later elaborations in the areas of pharmaceuticals and public health are seeking a compromise between the wishes of the developed world to internationalize patents and the needs of the developing countries to decide individually how much of the new rules could be accepted and when to use the exceptions in a way which would help the sick and the poor. However, the fight between the pharmaceuticals and their respective associations on the one hand and eager ministers of health trying to provide medicines to their poor populations at lower prices is far from over. The 2005 controversy between the Brazilian government and Abbott Laboratories, to be discussed below, provided just one example (see also Cohen/Lybecker 2005).

The issue of solving the dilemma of simultaneously lowering the costs of life-saving medicines in developing countries and maintaining incentives for innovation and research for drugs and other medical treatment remained on the table of many a meeting between 2001 and 2004. It was on the suggestion of the Brazilian representative to the World Health Organization which led to the establishment of the Commission on Intellectual Property Rights, Innovation and Public Health (CIPIH) in February of 2004. The task of the Commission is to advance proposals that would provide better access to medication in developing countries without compromising the intellectual property rights of the research-based pharmaceutical industry.

3. The Role of International NGOs and Private Sector Response

Earlier, international NGOs had actively intervened to support the Brazilian government's stand in the world arena. None was more explicit than Oxfam, which, after analyzing the major issues of the conflict, came out with a number of recommendations (Oxfam 2001). These were, first, the US should cease the case against Brazil at the WTO and stop using "Section 301." Secondly, instead of suing Brazil for violations of patents, the multinational pharmaceuticals producing the patented AIDS medications should issue voluntary licences. Thirdly, WTO member states should agree to bolster health safeguards in the TRIPS agreement and give developing countries greater freedom to decide the duration and scope of pharmaceutical patents as well as allowing countries to require local manufacturing of patented products as part of their national development and health strategy.

The ensuing dialogue among representatives from NGOs, the multinational pharmaceutical companies, Brazilian government representatives and WTO officials came to similar though somewhat less radical conclusions. Sponsored by the Foreign Policy Centre in London, the report of one of those open meetings stated that, "despite dissonance over many of the fundamentals, the seminar opened several doors for potential solutions, among which were the introduction of a tiered patenting system, an increased flexibility of TRIPS for developing countries, and the creation of an international fund to support the consolidation of health systems in those parts of the developing world hardest hit by the AIDS virus" (Walters et al. 2001).

By 2004, two of those proposals had been translated into reality. The Doha Declaration gave a wider and much more flexible interpretation of the TRIPS agreements and the Global Fund against Malaria, AIDS and TB has been installed. In the meantime, within the above-mentioned CIPIH experts of intellectual property rights are rethinking and discussing some of the rules written into the relevant legislations of both the developed and developing countries.

An effective anti-AIDS campaign cannot succeed without a better healthcare system. As a consequence, many developing countries have pledged in their Poverty Reduction Strategy Papers (PRSPs) to improve the infrastructure of their healthcare systems, both by allocating more resources to the

sector and by making the current systems more efficient. In addition, the multilateral institutions as well as many national and international donors have committed an increasing amount of support programs in that area. Part of those efforts have resulted in the creation of the Global Fund to fight AIDS, TB and malaria (GFATM), providing one-off grants to both public and private organizations in countries affected by those three specific diseases.

In addition to multiple government pledges, the Gates Foundation is the No. 1 private sector participant in the Global Fund, in which the major pharmaceutical companies are not yet participating, because the Fund was not ready to accept the industry's suggestion to provide medicines instead of funds. On the suggestion and urging of WHO and UNAIDS, the MNCs have been active for a number of years in sponsoring diverse projects to fight infectious diseases in developing countries, most of which are locally oriented programs in Africa. Other multinational companies in manufacturing and mining have also started anti-AIDS programs in various African countries which go beyond prevention and providing medication to their own employees and their families by becoming engaged in community support against the disease. In Brazil, the important MNCs are all active in the prevention part and some have joined meetings with government health officials, which helps them to coordinate possible action with local and state governments.

In an effort to direct the attention of the MNCs to their "corporate social responsibility," Oxfam and its partners wanted to get a clearer picture of the pharmaceutical MNCs' commitments in the context of benchmarks, which were involving pricing and patents, R & D and the appropriate use of medicines, as well as joint public private initiatives (JPPIs) in 2000. In the context of interpreting the interfacing of the major players in the global health governance scene, it is worthwhile to briefly examine the benchmarks and then evaluate the corporate response and the NGOs' interpretation.

In the hotly contested area of pricing, the NGOs demanded the major pharmaceuticals make clear that the firms supported "substantially lower prices of medicines for developing countries" (Oxfam et al. 2002). In addition, calls were made for greater transparency of firms' pricing procedures. Not surprisingly, answers were not forthcoming, and the majority of the MNCs simply told the interviewers that they did not want to go beyond their mission or policy statements on social responsibility, which they had made available on their respective websites, which – again not surprisingly – had no statements on the specific issues raised by the researchers of Oxfam & Co.

The industry does not want be pinned down on such critical issues of pricing, patents and R & D. Nevertheless, there would seem areas of commitment which the NGOs could further explore jointly with the MNCs, as some already have done. Among them are first and foremost the Joint Public Private Partnerships (JPPPs) that have blossomed in the last few years. Oxfam does point out that these newly created "institutions" can be of critical value for developing countries, but the NGOs want to make sure that such issues as transparency and efficiency of the JPPPs will also be addressed once they are fully functioning. Clearly, here the MNCs could – and some of them already do – pledge not only continuous support but also press for increased social governance within those JPPPs.

Another area in which the MNCs have become more forthcoming is the research area, starting from increased funds going into R & D of tropical diseases, some of which are taking place in those countries. Again, the relative expenditures to total R & D are probably quite small, and since they are not published by the industry, critics have to fall back on estimates, which is not very helpful for anybody involved in the debate. Here, public pressure should mount to demand and receive greater transparency.

The final issue of the industry's self-regulation efforts for drug safety would seem another area in which the firms should be able to be more forthcoming and endorse World Health Organization standards of conduct, and not enforce their national standards, which could delay production and distribution of vital antiviral AID drugs to poor countries. On the other hand, a minimum of marketing and drug-safety monitoring of drug companies in countries with notoriously weak regulatory systems should also be a must. The pay-off in terms of long-term customer trust, and with it continuous sales and profits, should be substantial.

The Fight against AIDS and Global Health Governance

The narrative of the Brazilian fight against AIDS has highlighted the incredible amount of actions and interactions that have taken place and that still are occurring among official and unofficial representatives on the local, regional and national levels, and increasingly on an international level. Like in any other country, Brazil's policy-makers have been concerned with balancing their decisions between the need to provide basic health services to the whole population at reasonable prices (or, in emergency cases, for free) and incentives for health providers to be compensated for their research as well as for other investment in human and physical capital.

In way of summary, and considering the question of the extent to which the Brazilian AIDS campaign has led to a most interesting national and international exercise in conflict resolution, one should look more closely at the various policy areas and institutional modes that have been used in the context of the AIDS battle and to what extent those modes can also be applied in resolving issues in other health areas. The following explanations may help in pinpointing the institutional setups that have accommodated the varying demands on the policy-makers to lead that campaign to an at least temporary success story.

A framework developed by social scientists at the University of Cologne in the context of multi-level governing in the European Union would seem to be useful in analyzing the linkages among the various levels of politics affecting AIDS in Brazil (Scharpf 2001). As discussed earlier, a number of conflicting policy areas, supporting innovation and industry on the one hand and consumer protection and welfare on the other, are seen to be moderated and possibly harmonized through different institutional modes and processes. Some are traditional, such as intergovernmental and joint decision-making in international organizations, while others are new, such as the networking of the NGOs and open coordination through such newly created organizations as the private-public partnerships.

While it would seem simple enough to line up the major players on opposite sides of the field, with one group advocating for welfare issues and the other for market incentives, from the moment AIDS became a serious problem in Brazil, requiring fast action, it actually became much more complicated than one could have expected, beginning with the trials and tribulations of the national government and its policy-makers to come to grips with the disease and take action in the 1980s, only to revert then to inaction in the early 1990s. Here, indeed, the network mode provided through the well-organized local NGOs gave the all important push to have federal government agencies finally become fully involved in tackling AIDS in the mid to late 1990s.

Earlier on, joint efforts to confront AIDS on local and national levels were strengthened through an international institution normally known for its preference for hard-nosed projects. But even here, after the strengthening of AIDS awareness and cooperation within the country through the expectation of a World Bank project, renewed mistrust among the major actors prevailed once the project was executed. In short, the fight against AIDS in Brazil was not without hurdles and conflicts already early on, although most participants thought that fighting the disease together should be a must.

Joint decision-making became much easier once another external threat was envisioned, this time not by a new virus but by the multinationals. The conflicting policy goals of private profits vs. public welfare could not be more clearly drawn than as in the Brazilian AIDS case, and it was indeed a classical fight of economic vs. moral values that compelled the MNCs' compromise after they had marshalled government support at the national and international level. In the context of analyzing the interactions between the MNCs and the international organizations, the World Trade Organization moved to the forefront, although that organization had traditionally been involved only in international trade negotiations. With being assigned of responsibility for the liberalization of services, however, the WTO has also become active in developing and implementing an international legal base for strengthening intellectual property rights.

In the context of the prolonged Doha negotiations in 2001 and 2003, the WTO was getting pressure from "the South," which actively participated in and shaped international negotiations, helping developing countries not only to adjust to but also to reinterpret internationally accepted

rules and regulations concerning IPRs in general, and to search for compromises in such vital areas as the supply and pricing of pharmaceuticals in life-threatening diseases in particular.

What about the multinational pharmaceutical industries? Their early denial and later attempts to bring US government and WTO pressure on Brazil did not help them in maintaining their patent-protected prices for developing countries facing the threat of a devastating AIDS epidemic. At the same time, MNCs in general and pharmaceuticals in particular have become active in sponsoring an increasing number of programs, many of which they have implemented jointly with NGOs. That, however, does not answer the question about their future strategy and action. To find satisfactory answers to those questions, in-depth interviews and evaluations by specialist observers of this industry will have to be undertaken.[8]

The current investigation would rather argue that the MNCs may have lost a battle and would have been better off had they realized earlier the rising power of global networks and the new set of institutional realities in the world health arena. They have not, however, lost the fight to protect their profits, which are more seriously challenged on other fronts; e.g., imports of US drugs from Canada at reduced prices and pending law suits following the late revelations of deadly side effects of some of their most successful pain medications. Their influence on the US government, which happens to be the largest contributor to the Global Fund against the major infectious diseases and is engaged in large-scale bilateral efforts to support AIDS programs in many African countries, has remained as strong as ever, making sure that the long-run worldwide profitability of their enterprises will not be seriously undermined as long as their government maintains its power and its outlook.

In the case of AIDS medication, the demand for the latest string of ARVs being developed by the research-oriented pharmaceutical companies has been strong, both in Brazil and other developing countries, with tension between Brazil and the MNCs raised to a high level in mid-2005. Brazil again fought for substantial price reductions by threatening to issue a compulsory licence. While both national and international NGOs argued and asked the government to proceed and issue that licence, the health ministry preferred to negotiate and the first of the three companies settled for a price reduction rather than have Brazil exercise the harsher option.[9]

At this point in time, negotiations with two further pharmaceutical MNCs are underway, the ARVs drugs (together with that of the earlier price of Abbott's Kaletra) of which would amount to about $170 million, or close to 70% of its total imports of medications for the disease. That is certainly a significant amount to consider. If it establishes a "public health threat," however, is another question. Beyond the financial problem of paying for the medication, the problems of expanding and strengthening the infrastructure on the regional and local level remain large. Current estimates state that the public health agencies are treating about 170,000 AIDS patients, and hope to reach over 200,000 in 2008. That would still be far less than those being HIV-infected, estimated to be near to 600,000.

In sum, joint action and dialogue between those groups and agencies representing or favouring the incentive of the market system and those within or outside government pursuing the welfare function are ongoing and need to be dealt with on the global, national and local level. While a country study on a very particular illness can only highlight the potential for progress in pursuing a generally accepted framework within the rules and commitments of global health governance, it would seem that the confrontations and disagreements that have eventually led to mutually beneficial cooperation, both within Brazil and between the country and international actors, can provide a useful example of conflict resolution on all three levels of interacting public and private actors.

To what extent that model can be transferred to other countries, and to what extent it can be repeated many more times in Brazil itself, remains to be seen. Moreover, the fight against AIDS remains a tremendous challenge not only for Brazil but even more in many of the poorer developing countries, and requires clearer insights, greater efforts and firmer cooperation than described here to eventually overcome AIDS and other fatal diseases.

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8 This is part of the second phase of the current research project on Global Health Governance undertaken by the DUEI team in 2005/2006.

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The Impact of Regional AIDS Prevalence on Sexual Practices in Jamaica

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Abstract

This paper investigates whether the choice of sexual practices is influenced by the prevalence of AIDS within the Jamaican population using a nationally representative sample of 1,498 individuals, 15 to 49 years of age. It was found that regional variations in AIDS prevalence affect condom use consistency among unmarried individuals. Individuals were more likely to use condoms always during intercourse if they resided in high-prevalence areas. AIDS prevalence also has a statistically significant effect on the number of sexual partners. The statistically significant relationship between choice of sexual practices and AIDS prevalence remains after controlling for the level of current and past prevention activity.

Introduction

One of the main public health concerns in developing countries is the spread of HIV within the human population, especially among the young, economically active population. Many developing countries, including Caribbean countries, face a growing AIDS epidemic that is likely to reduce the potential for long-term economic growth as the labour force is impacted by morbidity and mortality and additional resources are diverted to the treatment of infected individuals (Barnett and Whiteside 2001; Dixon, McDonald and Robert 2001; Bonnel 2000; Nicholls et al. 2000; Cuddington and Hancock 1994; Cuddington, Hancock and Rogers 1994).

The threat posed by AIDS to economic activity and individual well-being makes it imperative that policy makers understand the factors that influence individual choice regarding sexual practices. Each country faces the question of how to create a message about HIV and AIDS that its population finds relevant to its decision-making process. An understanding of the factors that influence choice of sexual practices is a precursor to devising programs that can stimulate modifications in behaviour.

This paper seeks to determine whether one of the factors that influence the choice of sexual practices in the Jamaican population is the regional prevalence of AIDS. As the AIDS epidemic

grows or matures within a country, regional differences in AIDS prevalence are likely to emerge. As regional differences in AIDS prevalence emerge, individuals who continue to engage in unsafe sexual practices (e.g., intercourse with multiple partners and inconsistent condom use) face differences in the risk of contracting the HIV virus (Ahituv et al. 1996).

Two specific questions are posed in this paper. (1) Do individuals incorporate regional differences in the risk of contracting the HIV virus into their decision-making process regarding sexual practices? (2) If yes, to what extent does the regional prevalence of AIDS influence the choice of sexual practices?

This investigation is important for several reasons. First, while it is theoretically possible that individuals are choosing their sexual practices after incorporating the level of risk of contracting the HIV virus, the extent to which that occurs, or whether it occurs at all, remains an empirical question. Second, if the choice of sexual practices shows sensitivity to regional HIV risk, then the HIV prevention message should include information on the risk of contracting HIV in different regions. Third, if individuals who are not yet infected respond to the risk of contracting HIV by adopting safer sexual practices, their behavioural response could limit the spread of HIV.[1] From a macroeconomic standpoint, if individuals adopt sexual practices that reduce their risk of contracting HIV, the effects of HIV and AIDS on economic activity will be less than what would be expected if behaviour were completely inelastic with respect to risk (see, for example, Nicholls et al. 2000).

Theoretical Consideration

Standard economic theory of consumer choice offers a sufficient theoretical framework to analyze the choices faced by individuals in the context of the AIDS epidemic.[2] In a disease-free environment, unprotected sex with more than one partner might be the utility maximizing choice. However, in the presence of a growing AIDS epidemic, sexual risk-taking could be costly, with the price dependent upon the prevalence of AIDS within the population.

During any act of partnered sex, an individual's risk of contracting a sexually transmitted disease depends on the infectious status of one's partner, the infectivity of the disease, if the partner is infected, the sexual practices in which the individuals engage and the individuals' role in the sex act (Michael 2004). Since the infectivity of the disease and the individuals' role in the sex act are largely predetermined in heterosexual intercourse, the level of sexual risk really depends on the probability of having an infectious partner and the choice of sexual activity. Sexual practices could include, for example, whether sex occurs with or without a condom, the number of sexual events an individual engages in and whether the events occur with the same or different partners.

If we ignore, for now positive, assortative mating,[3] the theory and evidence that one's sexual partners tend to be drawn from a population with whom one has similar characteristics, and assume rather that individuals are coupling in a random manner, then in each region the probability of having an infectious partner is simply equal to the proportion of the adult population that is infected. Hence the "price" of engaging in unprotected sexual relations in any act of sexual intercourse is proportional to the regional AIDS prevalence.

According to economic theory of individual choice, the quantity of risk demanded is inversely related the price of risk. The choice of sexual practices (which reflects the demand for risk) should therefore reflect differences in the probability of having an infectious partner; that is to say, should reflect differences in the regional AIDS prevalence. It is therefore hypothesized that regional AIDS

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1 For example, Cuddington, Hancock and Rogers (1994), using data for a representative sub-Saharan country, show that a rise in condom use from 0 to 10% reduces steady-state AIDS prevalence by nearly one-half.

2 The health belief model (Becker 1974; Fisher and Fisher 2000) is an alternative theoretical approach to individual health choices.

3 Random coupling is not meant to be taken literally, but rather as a theoretical simplification. To the extent that positive assortative mating occurs, not everyone in the same region faces the same risk of contracting HIV. Hence one is not likely to observe a perfect correlation between AIDS prevalence and sexual practices. It is also necessary to control for the characteristics on which individuals are likely to sort.

prevalence will be inversely related to the number of sexual partners and positively related to the consistency of condom use.[4]

Methods

There are several ways of applying this basic economic model of behaviour to choices regarding sexual risk-taking. One is to assess whether condom use is sensitive to AIDS prevalence. Condoms are generally recognized as a reliable way of reducing the risk of becoming infected with the HIV virus (Ghys et al. 2002). But one can substitute away from risk by adopting other behaviours; for example, by reducing the number of sexual partners and eliminating sexual contact with casual partners. It has been shown elsewhere that the risk of an HIV infection is positively associated with having multiple sex partners (Wiggers et al. 2003; Meerkers et al. 2003; Hargreaves et al. 2002; Messersmith et al. 2000). It is reasonable to expect that individuals have more information about the sexual behaviour of a regular partner than about the behaviour of multiple regular or multiple casual partners.

In this paper an assessment of how closely behaviour conforms to the theory outlined above is carried out by investigating whether the frequency of condom use and the number of short-term partners are related to geographical variations in AIDS prevalence using cross-sectional data from a household survey of the Jamaica population.

We estimate an equation of the form:

$$SB = f(BG,SC,BH,RY)$$

This equation is estimated for two dependent variables of sexual choice (see Table 1.) The first dependent variable, "ALWAYS," is equal to 1 if the respondent says condoms are always used during sexual intercourse, and zero otherwise. The second dependent variable, "PARTNERS," is the number of partners with whom the respondent reportedly had sexual relations within the last three months.

The independent variables capture elements of the individual's background, BG (age, sex, skill level and education), social factors, SC (relationship status, residential stability, and whether the respondent knows someone who has been infected with the HIV virus or has died from AIDS), behavioural factors, BH (age at first sexual intercourse and frequency of alcohol consumption) and risk, RY (regional HIV prevalence, and location of residence). These variables are discussed below.

The dependent variable "ALWAYS" is a binary variable. The regressions were estimated assuming a normal density function (probit) using the Limdep statistical software. Individuals who said they were virgins were omitted in all instances. The condom use equation was estimated using all sexually active unmarried individuals and the subsample of sexually active individuals who are less than 30 years old.[5]

The variable "PARTNERS" is an integer variable, which typically means least squares would not be efficient. Therefore maximum likelihood estimates were obtained using the Poisson density function (Greene 2000). The marginal effects and statistical significance produced by the Poisson regression were not significantly different from the least squares estimates. Hence the least squares results are reported. All sexually active individuals for whom complete data were available were used in these regressions.

The main justification for performing the subsample analysis is that in Jamaica about one-half of

4 One possibility that arises but is not addressed directly in this study is the possibility that an individual who wishes to reduce the risk of contracting HIV substitutes one type of risk for another. For example, an individual might reduce the number of partners and at the same time decrease condom use. One could therefore find an inverse relationship between AIDS prevalence and the number of sexual partners, along with no statistical association between AIDS prevalence and condom use.

5 Condom use is almost universally absent among married or cohabiting couples.

Table 1: Variables and Definitions

Variable	Definition
Dependents	
ALWAYS	1- always use condoms, 0 otherwise
SHORT-TERM PARTNERS	Number of partners in last three months
Background	
Age	Current age
Sex	1- male 0- female
Hied	1-person educated above primary level, 0 otherwise
Social	
Married	1- person married or lives with partner, 0 otherwise
Reg. partner	1- person has a visiting partner, 0 otherwise
Dating	1- person has boyfriend/girlfriend, 0 otherwise
Stability index	Years living in community/Age
Know	1- person knows someone HIV positive or has died from AIDS
Behavioural	
Drinker	Consumes at least 1 alcoholic drink per week
Age first sex	Age at which first had sexual intercourse
Risk	
Prevalence	Parish rank by AIDS prevalence
High prevalence	Prevalence about sample median
KSA	Kingston and St. Andrew Region (major metropolitan area)
Prevention Activity	
Workshop	1-person attended HIV/AIDS education workshop in last year, 0 otherwise
Score	Number of correct answers on 10 true/false questions on how one can prevent an HIV infection

AIDS cases have been discovered among persons who are between the ages of 25 and 39 years. Given the typical length of the gestation period of the HIV virus, individuals seem especially vulnerable during their late teens to age 30. It is of interest to see whether the factors that influence the choice of sexual practices among this younger group of individuals are substantially different from factors that influence choices among older individuals.

Data and Variables

Data

The data for this study were collected in 2000 as part of the Ministry of Health's HIV/AIDS/STD Survey in Jamaica. The target population was adults aged 15 to 49 years. The sample was designed as a stratified multistaged sample. The first stage is the selection of census Enumeration Districts (EDs). Enumeration districts are fully contained within each administrative region (parishes). The EDs are selected with probability proportional to their size (measured by the number of dwellings in each ED). The second stage is the selection of dwelling units within each ED. From each ED an equal number of dwellings were selected using systematic sampling with a random start. At the household level, respondents were selected from a random number grid using anyone drawn within the specific age range.

Interviewers told potential respondents they were from a research company in Kingston collecting data on behalf of the Ministry of Health (MOH). Respondents were also told that the MOH

wanted to learn what individuals understand about certain illnesses. Same sex interviewing was the technique used. Same sex interviewing is regarded as favourable to promote respondent complacency and validity of information. Once a respondent from the survey household was randomly selected to be interviewed, individuals were told that the answers they provide to a series of personal questions would be kept confidential, that their names would not be recorded on the questionnaire and that they only had to answer those questions that they wanted to. There were a total of 1,498 respondents, of whom 1,277 were no longer virgins. The survey nonresponse rate is 15%. The variables used in this study are defined in Table 2.

The survey asked for limited background information, including sex of respondent, date of birth, educational attainment and religious affiliation. However, a wide range of behavioural data were collected, including drug use and alcohol consumption. The survey also asked respondent detailed questions on sexual history, including age at first intercourse, number of partners and condom use frequency. It was also ascertained whether the respondent had a history of sexually transmitted infections (STIs), their knowledge of STIs, HIV and AIDS, their attitude towards HIV/AIDS and persons living with AIDS, and whether they had been tested for the HIV virus.

Variables

Descriptive statistics are presented in Table 2. As Table 2 indicates, consistent condom use with regular sex partners is low in the population. Less than one in three respondents report consistent condom use. The proportion of respondents who use condoms consistently is similarly low among individuals who are less than 30 years of age. The typical individual has more than one sex partners. The average number of partners is 1.4.

The regional prevalence of AIDS was used as an indicator of the level of sexual risk within the population. Regional AIDS prevalence was measured by the cumulative number of AIDS cases in each parish as reported by the MOH. The MOH reports number of cases per 100,000 individuals. These prevalence rates are not used directly; rather, they are used to rank parishes in increasing order of prevalence. This method was adopted because it was thought that while respondents may not know HIV prevalence rates, they are likely to have a sense of the relative impact of the disease in different regions based on media health reports or anecdotal information. Furthermore, the ranking of regions by AIDS prevalence is virtually constant from year to year.[6]

A dummy variable was created equal to one if the respondent knows an individual who is infected with the HIV virus or has died from AIDS. Knowing someone with the HIV virus could change behaviour for two reasons. First, that knowledge may dispel misconceptions that HIV is only a health risk in certain populations (for example, among white homosexual males). Second, individuals who know how to prevent HIV transmission might regard that information as being irrelevant for their own choices. Knowing someone infected with the HIV virus could raise one's subjective assessment of risk. Almost 40% of individuals in the sample say they know someone who is infected with the HIV virus or has died from AIDS.

Other background variables used in the study includes the respondents age, sex and education and training. Most respondents (75%) either have completed secondary education or are currently enrolled. About 7% of respondents have a college degree; another 8% have been trained in a skill. Individuals with secondary education, skilled individuals and persons with a college degree were combined to form one education variable, "HIED." In preliminary estimation there appears to be little gain from using three categorical education variables.

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6 Cumulative AIDS prevalence as of December 2003 ranges from about 100 per 100,000 to over 700 per 100,000, according to the Ministry of Health (2003). Twenty-seven percent of individuals who live in low prevalence areas report using condoms always. On the other hand, 35% of individuals who live in high prevalence areas use condoms always. With respect to the number of partners, unmarried men under the age of thirty in low prevalence areas are twice as likely to have three or more sex partners (22.3%) as their counterparts in high prevalence areas (11.3%).

Table 2: Descriptive Statistics

	All respondents who have ever had sex		Persons less than 30 years of age who have ever had sex	
Variable	**Mean**	**Std Dev**	**Mean**	**Std Dev**
Dependents				
ALWAYS	0.31	0.46	0.31	0.46
SHORT-TERM PTNRS	1.43	1.15	1.47	1.24
Background				
Age	24.99	7.86	21.35	3.76
Sex	0.53	0.50	0.55	0.50
Hied	0.89	0.31	0.92	0.28
Social				
Married	0.24	0.43	0.16	0.37
Regular (visiting) Partner	0.34	0.47	0.37	0.48
Dating	0.19	0.39	0.23	0.42
Stability index	0.61	0.39	0.63	0.40
Know	0.38	0.48	0.36	0.48
Behavioural				
Drinker	0.24	0.43	0.24	0.43
Age first sex	15.05	2.84	14.70	2.62
Risk				
Prevalence	5.26	2.13	5.16	2.17
High prevalence	0.54	0.50	0.51	0.50
KSA	0.37	0.48	0.34	0.47
Prevention Activity				
Workshop	0.32	0.47	0.35	0.48
Score	7.70	1.83	7.61	1.84
Sample size	1277		978	

Twenty-four percent of the respondents are either married or living with a partner, while another 34% have a regular sexual partner, which in Jamaica is called a visiting union. Visiting unions are separated from "dating" because in Jamaica dating is more likely to be among younger individuals, while visiting unions tend to be among adults. Importantly, visiting unions are distinguished from dating because even though the individuals do not live together there are established financial obligations. In many cases individuals in visiting unions have children together. Individuals who are less than 30 years of age are less likely to be married or cohabiting.

Alcohol consumption and drug use (crack-cocaine) have been associated with sexual risk-taking in previous studies (Sly and Riehman 1999; VanLandingham 1993). There is a very low rate of reported drug use in this sample so the relationship between drug use and sexual risk-taking is not investigated. On the other hand, alcohol consumption is more prevalent. Twenty-four percent of respondents consume at least one alcoholic drink per week.

The main thesis of this paper is that individuals in high AIDS prevalence regions will adopt safer sexual practices in response to the greater risk of contracting HIV from a sex partner. However, it is possible to observe safer sexual practices in high-prevalence areas as a result of greater prevention efforts in high-prevalence areas. To control for the effect of recent prevention activity, the regressions

include the dummy variable "WORKSHOP," which is equal to 1 if the respondent attended an HIV/AIDS education workshop within the last 12 months. The effect of past prevention activity is controlled for using the respondent's score on 10 true/false questions that test the person's knowledge of HIV prevention. If high AIDS prevalence areas benefited from greater levels of prevention activity in the past, it should be reflected in better knowledge of how to prevent an HIV infection, which should be reflected in safer sexual practices.[7]

Results

In Table 3 multivariate probit results for frequency of condom use are reported. Columns two and three of the table report results for all unmarried individuals who were sexually active in the 12-

Table 3: Probit Marginal Effects for Consistent of Condom Use During Last Year

	All sexually active unmarried respondents		All sexually active unmarried respondents under 30 years of age	
Variable	**b**	**t**	**b**	**t**
Intercept	-0.92**	-6.17	-0.84***	-5.08
Background				
Teen	0.17***	4.78	0.17***	4.69
Sex	0.14***	3.72	0.13***	3.05
Hied	0.09	1.58	0.06	0.94
Social				
Dating	0.07*	1.78	0.07	1.57
Single	0.07*	1.73	0.10**	2.27
Stability index	-0.06	-1.46	-0.06	-1.34
Behavioural				
Drinker	-0.06	-1.45	-0.07	-1.51
Age first sex	0.03***	3.68	0.02***	3.04
Risk				
Prevalence	0.02**	1.98	0.02*	1.82
KSA	-0.12***	-2.83	-0.12***	-2.67
Prevention Activity				
Workshop	0.08**	2.29	0.08**	2.21
Score	0.01	1.24	0.01	0.82
Model Stats				
Chi-squared	78.70		66.48	
Log-L	-479.86		-420.09	
Restricted Log-L	-519.21		-453.33	
Sample size	843		728	

*** indicates significance at the 1% level
** indicates significance at the 5% level
* indicates significance at the 10% level

7 The two variables are not collinear. Workshop attendance and knowledge of HIV prevention score have a statistically significant correlation ($p < 0.03$). However, the correlation between the two variables is a mere 0.06.

month period prior to the survey for whom complete data are available. Columns four and five report results for unmarried persons less than 30 years of age. All results are marginal effects, which are partial derivatives at the means of the right-hand-side variables. Marginal effects have the same interpretation as least squares coefficients.

The results reported here show a clear association between regional AIDS prevalence and frequency of condom use. In both subsamples, the coefficient on the regional AIDS prevalence variable is positive and statistically significant. The coefficient indicates that on average an individual who resides in the region that is ranked 5 in AIDS prevalence is 10% more likely to use condoms always during intercourse than an individual who resides in the region that is ranked the lowest.

Several other variables show positive association with consistency of condom use. These variables include age, sex, the age at which the individual commenced sexual intercourse, and recent participation in an HIV/AIDS education workshop. First, teenagers are more likely to use condoms consistently during intercourse than older adults. The composition of the sample makes no difference to this result. Similar results are obtained regarding males versus females. Males are more likely to report that condoms are used consistently during intercourse than females. Similar results have been reported elsewhere (Meekers and Klein 2002) and probably reflect that in heterosexual intercourse men have significant control over whether a condom is used.

The age at which the individual commenced sexual relations has a positive and statistically significant effect on condom use consistency. On average, individuals begin sexual intercourse at age 15. Condom use consistency increases by three percentage points on average for each year that the start of sexual intercourse is delayed. Finally, individuals are more likely to use condoms always during sexual intercourse if they participated in an HIV/AIDS education workshop within the year prior to the survey. Education, while positively associated with condom use, is not statistically significant. Also, HIV prevention knowledge score, while positively associated with condoms use consistency, is not statistically significant. A similar finding has been reported in other settings (Magnani et al. 2001; Gray and Saracino 1989; Baldwin and Baldwin 1988).

Three variables show negative relationships to condom use. These variables are regular alcohol consumption, location stability and residence within the capital city. The first two variables (alcohol consumption and location stability) do not have statistically significant coefficients. However, on average, persons who reside in the capital region are 12% less likely to use condoms consistently than individuals who live elsewhere.

Number of Sex Partners

In this section we turn to the relationship between the number of sexual partners in the last three months and AIDS prevalence. The regression results are reported in Table 4. The workshop attendance variable was eliminated from the final model reported in the table because the t-ratio on the coefficient was almost zero. Also, in these regressions AIDS prevalence is entered as a binary variable equal to one if the individual lives in a high-prevalence region. High prevalence is defined as a region having AIDS prevalence above the sample median. This specification provides a better fit to the data than the linear specification.

As was the case with condom use consistency, the data show a clear relationship between AIDS prevalence and the number of sex partners. Not only is high AIDS prevalence negatively associated with the number of sex partners, the coefficient is 50% larger in the regression using the subsample of adults who are less than 30 years of age. Two other variables have a negative and statistically significant relationship with number of partners, the age at which the individual first started sexual intercourse and the knowledge of HIV prevention. Knowledge of how to prevent an HIV infection is only statistically significant among younger individuals.

Men tend to have more sex partners than women. The coefficient is relatively large and statistically significant. Persons who are educated above primary level have more sex partners than individuals with only a primary education. Unmarried persons also have more sex partners that married persons, with little variation by relationship type. In other words, individuals who are single, all else

equal, have as many sex partners as individuals who have a regular visiting partner. Regular alcohol consumption is also positively associated with number of sex partners.

Table 4: Regression Results: Number of Partners with Whom Had Sexual Intercourse in Last Three Months

	All sexually active respondents		All sexually active respondents under 30 years of age	
Variable	**b**	**t**	**b**	**t**
Intercept	1.64***	5.34	2.11***	5.23
Background				
Teen	-0.07	-0.84	-0.10	-1.02
Sex	0.40***	4.84	0.39***	3.79
Hied	0.24**	2.15	0.32**	2.08
Social				
Reg. partner	0.32***	3.65	0.33***	2.82
Dating	0.25**	2.29	0.26*	1.84
Single	0.34***	2.76	0.37**	2.33
Know	0.10	1.32	0.10	1.13
Behavioural				
Drinker	0.18**	2.11	0.19*	1.80
Age first sex	-0.04***	-3.03	-0.07***	-3.69
Risk				
High prevalence	-0.15**	-2.09	-0.22**	-2.58
Prevention Activity				
Score	-0.03	-1.30	-0.04*	-1.67
Model Stats				
R2	0.11		0.12	
F	11.11		9.49	
Log-L	-1468.35		-1162.83	
Restricted Log-L	-1526.59		-1212.30	
Akaike Info Crt.	3.03		3.16	
Sample size	978		744	

Discussion

The previous sections of this paper described multivariate regression results that show that choices regarding sexual intercourse in this sample of Jamaicans reflect concerns for the risk associated with unprotected intercourse and intercourse with multiple sex partners. The level of risk in the population was measured by the cumulative prevalence of AIDS in each region. Higher AIDS prevalence is associated with a higher probability that condoms are used always during sexual intercourse and with individuals having fewer sex partners. Hence the main hypothesis of the paper receives some support from the data.

In section two the possibility was suggested that when individuals react to the prevalence of AIDS by reducing the number of partners condom use could decrease simultaneously. Even if that is the case, it appears that AIDS prevalence has an independent effect on condom use.

The positive relationship between AIDS prevalence and condom use and the negative relationship between AIDS prevalence and number of sex partners show that even within a developing country the spread of HIV will be limited by the response of rational individuals to the degree of risk that the disease poses. Although the results were derived from a sample of the Jamaican population, Jamaica shares some characteristics with other middle-income countries that might suggest these results will not be unique. One of the important characteristics of this population is the high level of educational attainment. Over 80% of the population has achieved at least a secondary level education, and educational attainment is similarly high for men and women. Education raises the chance that individuals properly interpret and internalize information on AIDS prevalence, and increases the likelihood that the information is incorporated in decisions about sexual intercourse.

The relationship between AIDS prevalence and safer sexual choices offer some insights that may be useful for HIV health promotion and prevention. Discussing rates of AIDS prevalence might help individuals improve their assessment of the risk of contracting HIV in their local region, as well as areas outside their region. Individuals are shown in this paper to be adept at using information in their decision-making process.

From a prevention point of view, it is also important to point out that more recent participation in AIDS education and prevention workshops was more strongly associated with condom use than knowledge of HIV prevention. Knowledge of HIV prevention is high, averaging 7.7 correct responses of a possible total of 10. In low-prevalence areas, the average is 7.4. The lesson here is that even when individuals are aware of how to reduce or eliminate their risk of contracting HIV, continuous AIDS prevention education is necessary to remind individuals that the possibility of contracting HIV is always present.

At this point a few comments about the credibility of the key results described above might be in order. One potential concern is that the answers respondents provided to questions about sexual choices are influenced by the answers they gave to other questions. For example, reminding an individual that they know someone who has AIDS or reminding them of the existence of AIDS in general might prompt them to report condom use. In this survey such a possibility is significantly reduced, if not eliminated, by the ordering of the items on the questionnaire. All background questions, as well as questions on sexual choices, occurred well in advance of the questions on HIV and AIDS. Furthermore, respondents would not know in advance that questions on HIV and AIDS would occur later in the survey.

A second concern is whether the results described could be explained by differences in HIV prevention activity in different regions due to differences in AIDS prevalence. Controlling for the effect of current and past prevention activity on sexual choices by including current workshop participation and data on HIV knowledge significantly reduced this possibility. Those variables had independent effects on sexual choices, but did not eliminate or even reduce the estimated effects of AIDS prevalence on choices regarding consistency of condom use and number of sex partners.[8]

Conclusion

In this paper it was shown that local AIDS prevalence plays an important role in decisions regarding choice of sexual practices in Jamaica. Regional AIDS prevalence, measured by cumulative AIDS prevalence, had a significant, positive effect on condom use consistency among unmarried individuals. At the same time, individuals who reside in high-prevalence areas have fewer sexual partners than individuals who reside in areas with lower AIDS prevalence. The main importance of these findings is that the choice of sexual practices is sensitive to the level of risk that individuals face during sexual intercourse. Hence the spread of AIDS could be limited by the incentive that individuals have to adopt practices to protect themselves.

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8 It should also be noted that in this survey individuals were not shy about buying condoms. They knew where to purchase them and there was little concern over affordability. I also explored the possibility that the number of partners is related to differences in religious affiliation, but did not find a significant relationship between religious affiliation and number of partners.

These results show individuals making rational choices to substitute away from risk as the level of risk increases. These results are remarkable because of the social context of West Indian populations, particularly the need for young men to prove their virility to peers by producing children, which could negate the effect of the higher cost of risk-taking.

These results also suggest that programs that aim at increasing the proportion of individuals who use condoms in a consistent manner are more likely to be effective if they focus on increasing awareness of the prevalence of AIDS in the local region, as well as the prevalence of AIDS outside the local region. Emphasizing the prevalence of AIDS might also be an effective strategy in encouraging individuals to reduce the number of sex partners. Focusing on AIDS prevalence could strengthen the perception of vulnerability and lead to safer sexual choices.

Finally, the need for individuals to be continuous involved in AIDS education workshops and discussions were brought out by this study, even though knowledge of how to prevent HIV infection is fairly high within this population. Knowledge of how to prevent infection appears to be less potent than recent participation in AIDS education workshops in encouraging condom use. On the other hand, recent workshop participation was unrelated to the number of sex partners. Therefore the way in which limited resources are applied to prevention efforts depend on the goals of the public health administrator. There is a clear need to increase the percentage of persons who use condoms consistently. Increasing condom use consistency appears to be best accomplished by a combination of continuous education and a focus on the risk of HIV infection by emphasizing the prevalence of the disease.

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Effects of Family Frailty on Child Mortality: Ivory Coast Experience

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Abstract

This article examines the impact of family-level clustering on under-five mortality risk by a Bayesian approach. A proportional hazard model with multiplicative random effect is applied to a sample of 6,804 children's survival times. This data set results from the 1998/99 Demographic and Health Survey conducted in Ivory Coast. When the frailty is Gamma distributed, a variance of 0.32 is obtained, which indicates that family membership significantly affects child mortality risk.

Introduction

Infant mortality rate has globally decreased in West Africa: from 156 per 1,000 in 1960 to 107 in 1998, a figure of nearly 31% (UNICEF 2001). Determinants of child mortality have been intensively studied (Pebley and Stupp 1987; Martin et al. 1983). Among others, the most discussed factors are the sex of the child, its birth order, the survival status of the previous child, the previous/subsequent birth interval, the mother's schooling and marital status, the maternal age and the household characteristics. However, major studies have not considered the dependence between mortality risks for children belonging to the same family (Manda 1999; Kuate Defo 1992; Akoto and Tabutin 1990). Observations from members of the same family share certain characteristics which are not captured by the covariances included in the standard model (Guo and Rodriguez 1992). Ignoring such family-level correlation may lead to biased parameters estimates.

Various sources of unobserved family frailty (Vaupel et al. 1979) have been identified, which can be of genetic, socioeconomic or behavioural form. In effect, children from the same parents may inherit common genetic factors (Guo 1993) which may affect their natural defence system and increase their susceptibility to infection. Moreover, some women repeatedly experience complica-

1 For correspondence.

tions in pregnancy and delivery which affect the baby's health (Curtis et al. 1993). In addition, mothers usually adopt similar childcare behaviours for all their children and multiple deaths in a family may be due to insufficient parental education in childcare (Das Gupta 1990). For example, the mother does not have enough knowledge and resource in the use of health services and the detection of childhood diseases. In some cases, the mother even lacks competence in appropriate breastfeeding practice. Socioeconomic factors are related to the family environmental and cultural behaviour. In addition, unobserved heterogeneity may also operate at the community level (Sastry 1997). However, the use of "cluster"[2] variable stratification in this data has not proven to really define any community classification (Kuate-Defo 2001). Hence, in the present study shared frailty is studied at the family level only.

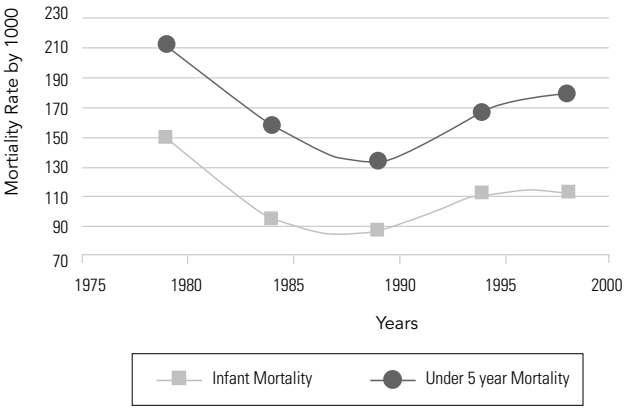
Previous studies related to correlated sibling mortality mostly used the Expectation Maximization (EM) algorithm (Sastry 1997; Curtis et al.1993; Guo and Rodriguez 1992). Although the EM is fast, its results heavily rely on the choice of starting values. Hence, the algorithm may sometimes converge toward a local maximum instead of the global one (Robert and Casella 2002). To circumvent this problem, a full Bayesian approach can be used. The goal of this work is to investigate the effect of family heterogeneity on child mortality risk from a Bayesian perspective using data from Ivory Coast.

The structure of the paper is as follows. Section 2 describes the data and the covariates of interest. The Bayesian model and the computation approach are presented in section 3. The results are discussed in section 4. Section 5 contains some concluding remarks. Further results of the Markov Chain Monte Carlo (MCMC) inference are shown in the appendix.

Data and Covariates

The data used in the present study result from the Demographic and Health Survey (DHS 2001) program conducted in Ivory Coast (between September 1998 and March 1999). A representative sample of 3,040 women, aged 15–49 years, was interviewed. The survey questionnaire included a complete birth history, as well as information on maternal education, household, and related subjects. Of this sample, a total of 6,804 single births from 1,935 women occurred. The study data is constituted by this reduced sample in which 1,022 children (15%) died by the time of the interview. Infant mortality in Ivory Coast was about 10.7% in 1998 (UNICEF 2001). Figure 1 shows child mortality trends in Ivory Coast from 1979–1998. A reversal in the downward mortality trend starts by end 1989. Mortality among children under five years increased by more than 7% in the 1990–1998 period.

Figure 1: Child Mortality Trends, Ivory Coast, 1979 – 1998.



Source: DHS Statcompiler www.measuredhs.com
(Note: Infant mortality refers to mortality for children aged less than 1 year.)

The effects of the following covariates are studied: the mother's age at the child's birth, the sex of the child, the child's birth order, the survival status of the previous child, the duration of breastfeeding and the length of the preceding and succeeding birth intervals. Maternal age (at birth of the child) is a commonly used covariate. Previous studies usually showed that children born from women at

2 The cluster number is "the number identifying the sample point as used during the fieldwork. This variable may be a composite of several variables in the questionnaire." (DHS Individual Recode Data File, www.measuredhs.com.)

youngest and oldest age are subject to highest risk of death (Sastry 1997; Pebley and Stupp 1987; Trussell and Hammerslough 1983). However, Martin et al. (1983) found that children born from the oldest women have a lower mortality risk in data from Indonesia and Pakistan. Lalou and Legrand (1997) also concluded to the same puzzling effect of mother's age on child mortality in Bamako, Mali. The sex of the child is also a significant covariate: mortality used to be higher among boys than girls, at least during the first months of life (Trussell and Hammerslough 1983). Large birth order is generally risky for child survival, but first-born children also experience a high mortality rate (Hobcraft et al. 1985). Findings from several studies demonstrate that short preceding and succeeding birth intervals largely increase child mortality risk (Guo 1993; Miller et al. 1992; Pebley and Stupp 1987). However, Koenig et al. (1990) found a lower effect of short birth spacing. A variable related to whether the previous child died or did not prior to conception of the reference child was also used in the model. The duration of breastfeeding was not included in the study, since that variable contains a nonnegligible proportion of missing values (maybe due to lack of memory for earlier births).

Table 1: Summary Statistics for Covariates, Ivory Coast (1998/99 DHS).

Covariates	Summary (%)	Values
Sex of child		
Females	49.4	1 if girl
Males	50.6	
Maternal age		
Mean (years)	26.04	
Linear		(age-26)
Squared		(age-26)^2
Previous sibling status		
Death	12.3	1 if yes
Birth order		
Preceding birth interval		
First child	28.4	1 if first birth
Short (<18m)	6.7	1 if short interval
Med.(18-24m)	10.6	1 if medium interval
Long (>24m)	54.2	1 if long interval
Succeeding birth interval		
Short (<12m)	1.3	1 if short interval
Long (>12m)	70.3	1 if long interval
Last birth	28.4	or last birth
Total births	6804 (84.98%)	
Total deaths	1022 (15.02%)	

Information (taken at the time of interview) on household income, father/mother's occupation and education level has also been omitted because such information might have changed during the time preceding the interview. Nor was the source of drinking water included, since more than 10% of the women did not answer the question.

Table 1 gives the summary statistics of the variables used in the study. The sample of children contains almost as many girls as boys. On average, mothers gave birth at age 26 years and approximately 12% of the children experienced the death of a previous sibling. The table also shows that most interbirth periods are long (24 months and 12 months for preceding and succeeding interval).

Table 2 shows the distribution of children by family. The 1,935 mothers having births represent the family subdivision. The number of births per mother varies between 1 and 14, with a mean of 3.52. A nonnegligible level of clustering is expected, since more than 90% of the children belong to families that contribute two or more births (Sastry 1997). Nonparametric analysis of child survival times, obtained using the Kaplan-Meier survival curves (Kaplan and Meier 1958), are shown in Figure 2. Female children have lower risk of death, as well as children whose previous sibling was alive by index's child birth. There is also greater survival chance for children with longer preceding or succeeding birth interval.

Table 2: Distribution of Deaths by Family Size, Ivory Coast (1998/99 DHS).

		Number of Children Who Died								Total Mothers	Children	
		0	1	2	3	4	5	6	7		Total	%
Number of births per mother in 10 year period	1	464	61							525	525	7.7
	2	259	75	10						344	688	10.1
	3	172	78	20	3					273	819	12
	4	116	64	25	4	3				109	836	12.3
	5	96	53	19	4	3				175	875	12.9
	6	60	49	19	8	1				137	822	12.1
	7	38	41	18	6	4				107	749	11
	8	22	25	9	7	1				64	512	7.5
	9	17	10	16	10	6				59	531	7.8
	10+	3	11	10	7	5	2	2	2	42	447	6.6
Total		**1247**	**467**	**146**	**49**	**20**	**2**	**2**	**2**	**1935**	**6804**	**100**
% of children		64.5	24.1	7.6	2.5	1	0.1	0.1	0.1	100		
% of deaths			45.7	28.5	14.4	7.8	1	1.2	1.4	100		

(Note: Analysis times are in years.)

A parametric model is used to quantify the effect of each covariate on child mortality risk. The distribution of the model parameters are estimated through a Bayesian approach.

The Bayesian Model

Denote by t_{ij} the random survival time of the j^{th} child from family i and $\theta=(\hat{a}, w_i)$ the unknown parameters of the model corresponding to the data. The parameter w_i represents the family random effect and $\hat{a}=$ (ß1, ß2,…) is the vector of fixed effect coefficients. The family random effect is assumed to act on the conditional hazard $h(t_{ij} \mid \hat{a}, w_i)$ in the following multiplicative way

$$h(t_{ij} \mid \hat{a}, w_i) = w_i \lambda_0(t_{ij}) \exp(ß1X1_{ij} + ß2X2_{ij} + \dots). \quad (1)$$

Our aim is to find the distribution of the family effect w_i. The Bayesian approach updates the prior belief ($\pi(\hat{a}, w_i)$), using the data in order to obtain the posterior distribution, which represents new beliefs after having observed the data (Gelman et al. 1995). The posterior distribution of θ conditioned on the data is proportional to the product of the likelihood function, and the prior distribution (π stands for the distribution of interest and l for the likelihood)

$$\pi(\hat{a}, w_i \mid t_{ij}) \propto \pi(\hat{a}, w_i) \times l(t_{ij} \mid \hat{a}, w_i). \quad (2)$$

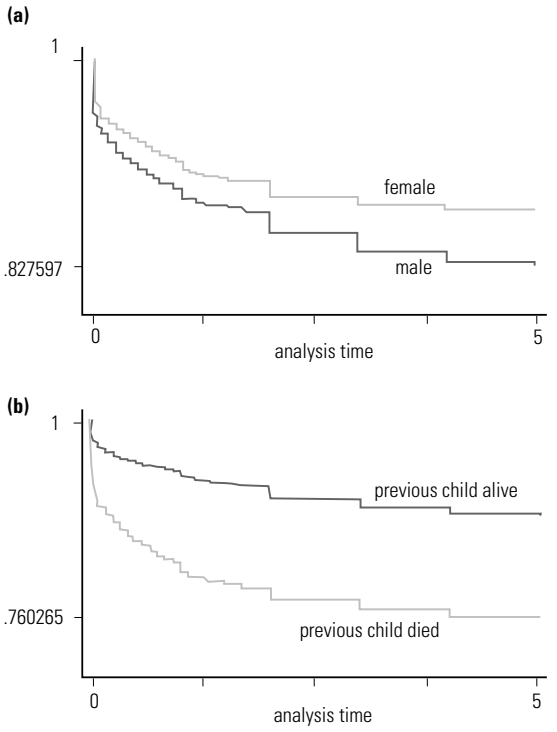
The Likelihood Function

Previous studies have shown that the effect of the chosen covariates on child mortality does not have equal importance over the whole period of childhood (Sastry 1997; Guo and Rodriguez 1992). Hence the study time period is split into five intervals with cut points at 3, 6, 12 and 24 months (based on preliminary analysis not shown here). Within each interval I_n, the baseline hazard is assumed constant: $\lambda(t_{ij}) = \lambda_n$ for $t_{ij} \in I_n$. Under that assumption, the likelihood function coincides with that of a Poisson distribution with mean $E_{ijn}\lambda_{ijn}$, where E_{ijn} and λ_{ijn} denote, respectively, the time lived in the interval I_n and the hazard function for the j^{th} child from the i^{th} family (Laird and Olivier 1981).

The Prior Specification

To compute the prior distribution $\pi(\hat{\mathbf{a}}, w_i)$, a widely used conjugate prior is adopted for the family frailty (Guo 1993): $w_i \sim Gamma(\tau,\tau)$, with $\tau \sim Gamma(1,1)$ for simplicity. The matrix of fixed effects $\hat{\mathbf{a}}$ follows a multivariate normal distribution with zero mean and low precision Σ: $\hat{\mathbf{a}} \sim Normal_q(0,\Sigma)$.

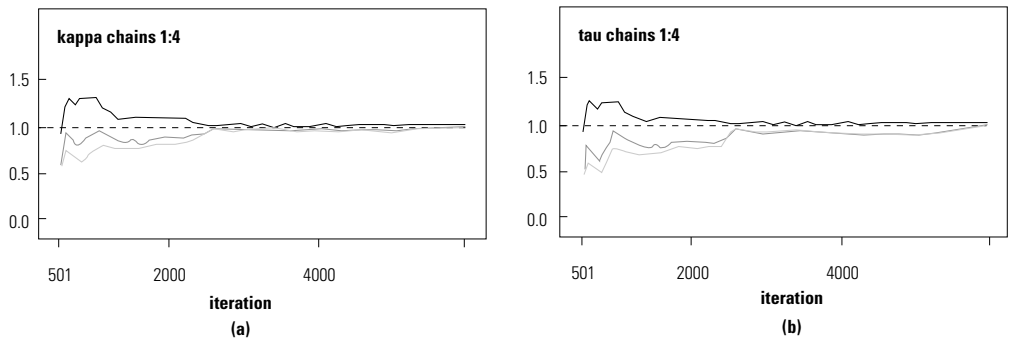
Figure 2: Kaplan-Meier Survival Graphs (a) by Child Sex and (b) by Previous Child Survival Status, Ivory Coast (1998/99 DHS).



The Posterior Distribution

The posterior distribution, resulting from (2), has a form which makes it complicated to sample directly from it. Hence, a Markov Chain Monte Carlo (MCMC) simulation is performed using the defined priors and likelihood functions. The Markov chain algorithm, after a suitable initial burn-in period, is expected to reach a stationary distribution which is the same as the desired posterior distribution (Gelman et al. 1995). Following previous studies on a hierarchical model (Robert and Casella 2002; Bolstad and Manda 2001), the distributions of the nodes, conditional on all the parameters, are assumed independent of each other.

Figure 3: Gelman-Rubin Graphs for (a) Family Frailty and its (b) Variance, Ivory Coast (1998/99 DHS).



The Computation

The algorithm suggested by Bolstad and Manda (2001) can be used to sample from the posterior density of the family frailty. In the present study, we used our own algorithm (available on request), written by using the Bayesian software WinBugs (Spiegelhalter et al. 2003).

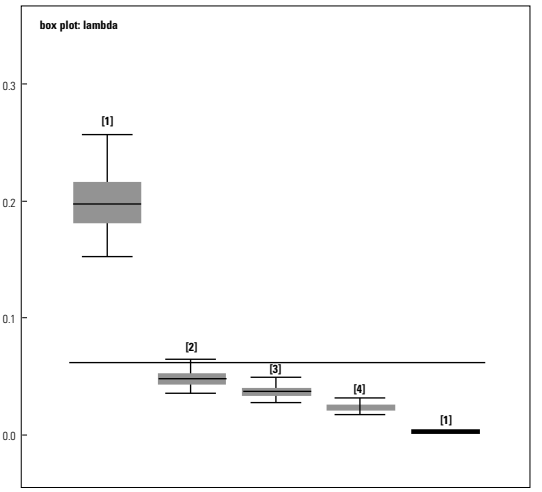
After 2,000 simulations for burn-in, 5,000 iterations were performed on four chains with different starting values. The Gelman-Rubin factors (Gelman and Rubin 1992) were used as convergence criterion. This factor describes how much the increase in the number of iterations may improve the

estimates. Values under 1.2 correspond to approximate convergence of the Markov chain (Congdon 2003). Factors very close to 1 were obtained for the fixed effects. Figure 3 shows the Gelman-Rubin (GR) factor for the family frailty and its variance. The GR factors ranged between 0.7 and 1.3 during the first thousand iterations, and reached 1 after 2,500 iterations. These results do not contradict the convergence observed with the chains' historical time series.

Results

Figure 4 shows the values of the baseline hazard, by time interval. Similarly to previous studies on child mortality (Bolstad and Manda 2001; Sastry 1997; Guo and Rodriguez 1992), the child mortality risk is higher (0.2) in the first two months of life, and then decreases over age. The relative risk of death for children three months is 1.22 times higher than the risk after 24 months. This may be due to inadequate delivery conditions and lack of prenatal vaccination in order to guarantee child immunity against childhood diseases, among other causes. Household characteristics (nutrition and hygiene) and maternal health status may also contribute to high mortality risk at lower age

Figure 4: Box Plots of the Piecewise Constant Baseline Hazard, Ivory Coast (1998/99 DHS).



(NB: $\lambda_0[i]$ refers to the constant value on the i^{th} age interval. [1]=[0;3[, [2]=[3;6[, [3]=[6,12[, [4]=[12,24[, [5]=[12; ->)

The first column of Table 3 shows the results of the piecewise exponential model, which ignores the family clustering. The table indicates that mortality risk is slightly higher among boys than girls, as it was found in some previous studies (Bolstad and Manda 2001; Trussell and Hammerslough 1983). The relative risk of death for girls is 0.76 times the mortality risk among boys. The results also show that children whose previous sibling died experienced a risk of death 2.02 times higher than the risk for those with the immediate sibling alive. For the length of the preceding birth interval, the reference group has a preceding birth interval greater than 24 months. A preceding birth interval less than 18 months increases by nearly two times the child mortality risk. First births are also 1.5 times riskier.

A child whose younger sibling is born in a less than 12-month period is five times more likely to die than a child with a succeeding birth interval greater than 12 months. In effect, that child may receive less attention and care due to the mother's new pregnancy. Maternal age does not seem to be a determinant in the sample: relative risks of 0.97 and 1.00 are obtained for linear and squared effect respectively. A positive correlation (ρ= 0.7) is found between maternal age squared and death of previous child. Birth order is strongly negative correlated to maternal age squared (ρ= –0.84) as well as to linear maternal age (ρ= –0.72).

The last column of Table 3 depicts the results of the proportional hazard with multiplicative family random frailty. The posterior distribution of the family heterogeneity has a mean variance of 0.32 after controlling for the model covariates. This result suggests that child risk of death increases by 32% in a family where one child has died, compared to the mortality risk for a child belonging to a family where no sibling died (Guo 1993). This value lies in the range of family heterogeneity obtained in previous studies: Guo and Rodriguez (1992) found a variance of 0.22 for family random effect in Guatemala; Sastry (1997) obtained 0.516 for northeast Brazil; Bolstad and Manda (2001)

reported a variance of 0.843 for Malawi.

The mortality risk associated with child sex remains unchanged, as well as the risk related to maternal age, succeeding and preceding birth intervals. However, the relative effect of the birth order on mortality risk slightly increased (from 0.8 to 1) by including the family frailty term. Moreover, the posterior mean for the survival status of the previous child is lower in the model with frailty: a relative effect of 2.02 against 1.4 (when the model incorporates family frailty). A similar result was found by Sastry (1997) in Brazil and Guo (1993) in Guatemala.

Table 3: Comparison between Standard Proportional Hazard Model and Multiplicative Model with Family Gamma Frailty, Ivory Coast (1998/99 DHS).

Covariates	Model Without Family Effects	Model With Family Random Effects
	Posterior Beta Mean	Posterior Beta Mean
Sex of child		
Boy*	1	1
Girl	0.76 (1.17)	0.75 (1.07)
Previous child survival status		
Alive*	1	1
Death	2.02 (1.42)	1.39 (1.12)
Maternal age		
Linear effect	0.97 (1.04)	0.97 (1.01)
Squared effect	1.00 (1.01)	1.00 (1.01)
Birth order	0.82 (1.19)	1.03 (1.03)
Succeeding birth interval		
Long*	1	1
Short	5.18 (1.36)	4.58 (1.21)
Preceding birth interval		
First child	1.51 (1.27)	1.42 (1.11)
Short	1.99 (1.22)	1.78 (1.13)
Medium	1.39 (1.22)	1.30 (1.12)
Long*	1	1
Variance of Family Frailty		0.324 (0.095)

* indicates the reference group. **Standard deviation in parenthesis

Concluding Remarks

In this study, a Bayesian approach is used to explore the effects of family membership on child mortality risk. A proportional hazard model with multiplicative family frailty has been applied to data from the Ivory Coast 1998/99 Demographic and Health Survey. This study indicates that the death of the previous sibling increases two times the relative mortality risk of the following child. A possibility for this is that the premature death of a child exposes the nonbreastfeeding mother to the risk of new pregnancy, while her body is still physically (and mentally) weak. The interconception periods may then be shortened. As a consequence, children may have small weight at delivery due to improper fetal development (Scrimshaw 1996), and they may also experience high risk of transmission of infectious diseases (Ronsmans 1995).

This study also indicates that short interbirth periods, independent of previous sibling status, increase child risk of death. Indeed, reduced birth spacing not only affects the mother's health condition during each pregnancy, but also leads to large family size, where competition between siblings for nutritional and affective resources may occur. Hence, adequate policies should focus on teaching women family planning, which is not widely applied even if its benefits are known. The results indicate that the child's birth order affects his or her chance of survival. Sex difference in mortality risk was also found, with girls' risk of death being 0.76 times lower than the mortality risk of boys. Similar results were found in, for example, Sastry (1997) and Guo (1993).

In the pathways of previous researches (Sastry 1997; Trussell and Hammerslough 1983), children born from teenaged or old mothers were expected to have a higher mortality risk. However, in this sample, maternal age did not produce a significant impact on child survival (the relative risk associated with maternal age is 0.97). One explanation may lie in the customs still prevailing in the

region, where childcare is not solely restrained to the nuclear family, but is an extended family issue. Hence, the lack of experience (or financial resources) due to a mother's young age is overcome by other family members' contributions. Important family random effect is found with a variance of 0.32, compatible with other findings (Sastry 1997; Guo and Rodriguez 1992).

The Bayesian approach used in the study produces results consistent with previous works. Furthermore, this simple method offers various extensions worth studying: spatial representation of the national region with high child mortality risk can be produced. Such information is needed for targeted policy programs. However, the data set must contain clear spatial localization of each respondent.

Acknowledgements

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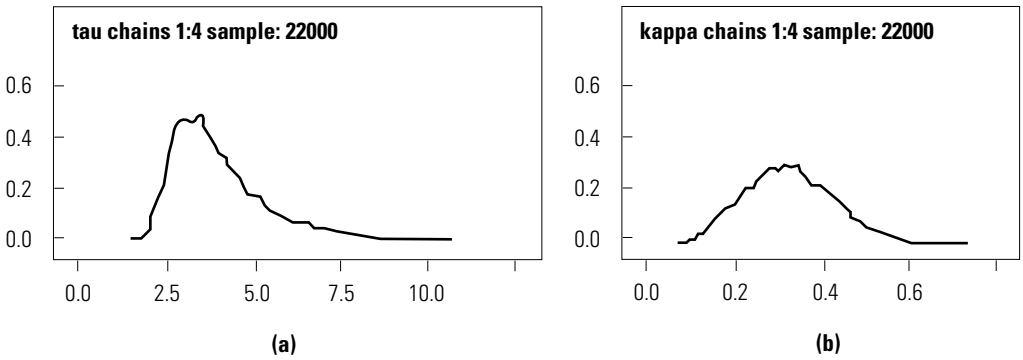
Appendix A

Kernel density for (a) Family Frailty and its (b) Variance, Ivory Coast (1998/99 DHS).



Antenatal History and Caesarean Section in the Southern Part of Kerala, India

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Abstract

Caesarean births were originally used as an emergency birthing alternative for complicated births and labours that endangered either the life of the child or the mother. A rising trend in Caesarean rates has been reported from Kerala, the state with the best demographic characteristics and access to health care within India. In this context, this paper examines the extent of Caesarean section among women aged 15 to 49 years with only one child born in the five years preceding the survey in the southern part of Kerala with respect to their antenatal history. This study revealed that Caesarean section in the southern part of Kerala is much higher than for the state as a whole. Based on mothers' reply, 28% of the first live births occurred by Caesarean section in the southern part of Kerala. The women who had a dreadful experience in antenatal history had higher odds of Caesarean section than other women.

Introduction

Caesarean childbirth, an operation to deliver a baby through an incision in the abdomen, can be traced back through history to Egypt in 3000 B.C. The procedure's name comes from a set of Roman laws, *Lex Caesare*, which in 715 B.C. mandated surgical removal of an unborn fetus upon death of the mother (U.S. National Library of Medicine 1998). Until recent decades the operation usually had been used as a last resort because of a high rate of maternal complications and death. But with the availability of antibiotics to fight infection and the development of modern surgical techniques, the once high maternal mortality rate has dropped radically. As a result, the Caesarean childbirth rate has increased dramatically in all parts of developed nations (Anderson and Lomas 1984). It has also become common in both developed and developing countries in recent years.

There are many factors which account for rising Caesarean birth rates. By the 1960s, increasing emphasis was being placed on the health of the fetus. With declining birth rates and couples having fewer children, even greater attention was given to improving the outcome of pregnancy and infant survival in general (Sachs, Koblin, Castro and Frigoletto 1999). Another important contributing factor was the rising number of repeat Caesareans. As the number of women having their first

Caesarean increased, the long-held tenet "once a Caesarean, always a Caesarean" led to rapid increase in the number of repeat Caesarean births (Grey Bruce Health Unit 2004). At the same time, advances in medical care combined to make maternal death from Caesarean childbirth a rare occurrence. The safer the procedure became, the easier it was to decide to perform the operation. As a safe alternative to normal delivery, the Caesarean became a practical way to try to improve the outcome of difficult pregnancies.

Studies suggesting the benefit of Caesarean birth in dealing with various pregnancy complications also led to more Caesareans (Gary, MacDonald and Gant 1989). Obstetricians came to favour surgery in pregnancies with difficult deliveries that formerly would have required the use of forceps. Increasingly, physicians used the Caesarean method to deliver infants in the breech position prior to birth, adding still further to the rising Caesarean rate. The availability of facilities and trained obstetricians were found to be associated with the performance of Caesarean section (Kabra et al. 1994). The source of payment for the delivery (Stafford 1990; Betrollini et al. 1992; Haas et al. 1993) and the place of birth – i.e., whether it was a private or a public sector institution (Peterson 1990) – also influenced the performance of C-sections. In India, the need for births to occur at a predetermined auspicious time on the astronomical calendar resulted in a patient demand for Caesarean sections (Kabra et al. 1994).

According to the National Family Health Survey, the Caesarean rate is much higher in Kerala than other Indian states (IIPS 1994, 11PS and ORC, Macro 2000). A rising trend in Caesarean rates, from 11.9% in 1987 to 21.4% in 1996, has also been reported from Kerala, the state with the best demographic characteristics and access to health care within India (Thankappan 1999). In this context, this paper examines the extent of Caesarean section among women in the southern part of Kerala with respect to their antenatal history.

Methods & Materials

The data for this empirical analysis is taken from a survey on safe motherhood in the southern part of Kerala, India. In Thiruvananthapuram district, the capital city of Kerala was chosen for this study. In this district there are four taluks (Thiruvananthapuram, Chirayinkeezhu, Neyyatinkara, Nedumangadu), from which the Thiruvananthapuram taluk was randomly selected. By simple random sampling, two different geographical areas such as rural area and urban area were selected from the separate lists of the selected taluk. The samples were drawn so as to have an equal proportion of total households in each selected area. The survey was conducted from February 2002 to June 2002 and contained a detailed enquiry about socioeconomic and demographic backgrounds and antenatal history of currently married women who had a child below age seven years in the five years preceding the survey. The information was collected from 1,122 currently married women aged 15 to 45 years from households in the selected area, out of which only 321 couples with single child were taken up for the present study. Using univariate and multivariate statistical analyses, the study measures the association between antenatal history and Caesarean section.

Results

Socioeconomic and Demographic Characteristics of Couples and Caesarean Section

Table 1 provides information of the first live birth during five years preceding the survey that were delivered by Caesarean section and the background characteristics of couples. Based on mothers' reports, 28% of first live birth deliveries occurred by Caesarean section in the southern part of Kerala in the past five years. There is no wide variation in Caesarean section by rural and urban setup. Caesarean sections occur much more often in mothers who belong to a group above age 30 years than for younger mothers. Caesarean sections occur more among mothers whose husbands are aged more than 35 years.

The proportion of deliveries by Caesarean section increases with both mothers' and fathers' education. Thirty-five percent of births to mothers who have completed above 10th class were delivered by Caesarean section, compared with only around 16% of birth by illiterate and primary-level educated mothers. Caesarean deliveries are much more likely to occur among women whose spouses have more educational status and those who have work other than the unskilled labour sector.

Table 1: Percentage Distribution Caesarean Section by Background Characteristics of Couples

Background Characteristics	Total number	Number (%) of Caesarean section
Area		
Rural	151	44 (29.1)
Urban	170	46 (27.1)
Total	321	90 (28.0)
Age of wife (in years)		
< 26	200	48 (24.0)
26– 30	102	33 (32.4)
> 30	19	9 (47.4)
Education of wife		
No schooling & Primary level	117	3 (15.8)
Class 6 - 10	185	46 (24.9)
Above class 10	19	41 (35.0)
Occupation of wife		
House wives	260	72 (27.7)
Working	61	18 (29.5)
Age of husband (in years)		
< 31	176	51 (29.0)
31– 35	99	25 (25.3)
> 35	46	14 (30.4)
Education of husband		
No schooling & Primary level	31	3 (9.7)
Class 6 - 10	200	54 (27.0)
Above class 10	90	33 (36.7)
Occupation of husband		
Unskilled	156	32 (20.5)
Salaried	56	25 (44.6)
Others	109	33 (30.3)
Duration of marriage (in years)		
1-3	216	64 (29.6)
> 3	105	26 (24.8)
Religion		
Hindu	235	69 (29.4)
Others	86	21 (24.4)
Type of family		
Nuclear	200	59 (29.5)
Extended	121	31 (25.6)

There is not much difference in Caesarean section by occupational status of wives. Among religious groups Hindu mothers (29.4%) are most likely to have delivered by Caesarean section. The difference in the proportion of deliveries by Caesarean section was around 4%, according to their family type.

Antenatal History of Mothers and Caesarean Section

Antenatal care (ANC) refers to pregnancy-related health care provided by a doctor or a health worker in a medical facility or at home. The safe motherhood initiative by policy-implementing authority (Ministry of Health & Family Welfare in India) proclaims that all pregnant women must receive basic professional antenatal care (Harrison 1990). So antenatal history has more importance in

pregnancy characteristics. Table 2 shows the percent distribution of first birth by Caesarean section in the five years preceding the survey by antenatal history of mothers. Forty percent of Caesarean sections occurred in private institutions, compared with 24.1% of Caesarean section in public institutions. While considering nutritional deficiency, Caesarean sections occurred significantly more among the women who had suffered nutritional deficiency during their pregnancy time ($p<0.05$). Women who suffered from any disease or any kind of reproductive health problem tended to deliver by Caesarean section. The percentage of Caesarean is significantly much higher for this group of women (more than 50%, $p=0.001$). Previous fetal wastage has no significant effect on Caesarean section in the southern part of Kerala.

Admission time for delivery has a significant effect on Caesarean section. Caesarean sections are more among women who admitted in hospital one day before delivery or the exact day of delivery. Caesarean sections are more common among women who delivered their baby after two years of their marriage.

Table 2: Percentage Distribution Caesarean Section by Antenatal History of Mothers

Antenatal History Variables	Total number	Number (%) of Caesarean section	Chi-square value	Odds ratio for having Caesarean section (95% confidence interval)
Type of hospital				
Government	241	58 (24.1)	7.56*	1
Private	80	32 (40.0)		2.6 (1.3-5.0)*
Nutritional deficiency				
No	288	76 (26.4)	3.77**	1
Yes	33	14 (42.4)		3.5 (1.4-8.7)*
Any disease during pregnancy period				
No	287	71 (24.7)	14.61*	1
Yes	34	19 (55.9)		3.6 (1.6-8.1)*
Previous fetal wastage			0.12	
No	24	6 (27.7)		1
Yes	297	84 (28.3)		1.3 (0.4-4.0)
Any Reproductive health problem				
No	253	49 (19.4)	44.49*	1
Yes	68	41 (60.3%)		7.8 (4.1-15.0)*
Admission time for delivery				
1 day before/delivery day	195	63 (32.3)	4.49**	2.2 (1.2-4.1)*
2 or more days before	126	27 (21.4)		1
First birth interval				
1 year	282	68 (24.1)	13.16*	1
> 1 year	39	22 (56.4)		5.4 (2.5-11.7)*

* $p < 0.01$

With multivariate logistic regression, all seven antenatal history variables considered for the model except previous fetal wastage have a significant relationship to Caesarean section. The odds for Caesarean section were significantly higher among the women who delivered their baby in a private hospital. The private institutions were 2.6 times more likely to perform Caesarean section than the public sector. The mothers with nutritional deficiency were 3.5 times more likely to have undergone Caesarean section than the healthy mothers. Mothers who were suffering with any kind of reproductive health problem during their delivery had higher odds of Caesarean section. Also the odds of Caesarean section were higher for mothers who delivered their first baby after two years of their marriage and those who were admitted for the delivery in a short period before their delivery date.

Discussion

Caesarean births were originally used as an emergency-birthing alternative for complicated births and labours that endangered either the life of the child or the mother. The Caesarean childbirth rate has increased dramatically in all parts of the world. According to the World Health Organization, no country is justified in having a Caesarean rate greater than 10 to 15%. However, the present study shows a much higher percentage of Caesarean section for the southern part of Kerala as compared to all of Kerala (13.7%) (IIPS 1995). According to the National Family Health Survey I & II, a rapid increase has taken place in the proportion of Caesarean section (IIPS 1995, IIPC and ORC, Macro 2000).

Caesarean section is major surgery, and brings with it many risks to both mother and baby. Babies born by C-section do not receive the natural stimulation that comes from moving down the birth canal, and therefore must often be given oxygen or a rubdown to help them breathe. They also miss out on the natural hormones that are released during vaginal birth to help the baby during his first moments of life (Mercola and Droege 2003). The National Population Policy adopted by the Government of India in 2000 reiterates the government's commitment to the safe motherhood programmes within the wider context of reproductive health (NPP 2000); the important thrust of the Reproductive and Child Health Programme is to encourage deliveries under proper hygienic conditions, under the supervision of trained health professionals, and thus save the life mother and child.

This study revealed that Caesarean section in the southern part of Kerala, in both rural and urban areas, is much higher than for the country as a whole. This paper formulated a model of Caesarean delivery in the southern part of Kerala with respect to the antenatal history of mothers. The model exposed that the women who had a poor experience in antenatal history had higher odds of Caesarean section than other women. Nutritional deficiency is also one reason for higher Caesarean section in this area. Nutritional deficiencies in women are often exacerbated during pregnancy because of the additional nutrient requirements of fetal growth. These deficiencies are a major threat to safe motherhood and to the health and survival of infants because they contribute to low birth weight, lowered resistance to infection and impaired cognitive development. The provision of iron and folic acid tablets to pregnant women to prevent nutritional anemia forms an integral part of safe motherhood services offered as part of reproductive and child health programmes. Every woman should accept the recommendation and consume 100 tablets of iron and folic acid during pregnancy.

Women who had suffered any kind of reproductive health problem or any kind of disease experienced a higher incidence of Caesarean section. Most of the delayed deliveries also ended up with Caesarean section in this region. Generally the delayed first birth by Caesarean section may be due to the previous fetal wastage, such as spontaneous abortion, disease or reproductive health problem during pregnancy period. But in this study, previous fetal wastage is not statistically significant for Caesarean section, so the second factor may be the main reason for the higher caesarean section in delayed deliveries.

The study supports the need for implementing a new strategy for eliminating reproductive health problems because absence of reproductive tract infections is essential for the reproductive health of both couples to meet their reproductive goals. Several studies have shown that many Indian women suffer from reproductive tract infections or often bear the symptoms of reproductive tract infections silently with out seeking health care (Santhya 2004), so it is relevant to take interventions to establish RTI/STI clinics at district/Taluk hospital level, provision for laboratory diagnosis of RTIs/STIs and screening and treatment of RTIs/STIs.

Caesarean sections conducted by private sector occur more often than those of public sector. Studies have also found that middle-class and upper-class women who have private physicians are more likely to have Caesareans because they develop closer relationships with their doctors. (Padmadas et al. 2000). There is reason to believe that the current Caesarean section rates are part of a rising trend. This cannot be attributed entirely to the rise in institutional deliveries alone because of the strong association between Caesarean sections and private sector institutions. It is possible that this extremely useful surgical procedure is being misused for profit purposes in the private sector in

several places, so it should be ensured that the Caesarean are done in an emergency situation only.

It is recommended that if the Caesarean is avoidable, physicians should be discouraged from delivery by Caesarean section. It is highly recommended that maternal educational programmes be directed to couples to provide scientific information on the problem of nutritional deficiency and reproductive tract infections. Recommendations include the action to encourage vaginal births among the couples.

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Unintended Pregnancy in Bangladesh

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Abstract

Unintended pregnancy is a serious concern in reproductive health which needs to be addressed. Analyzing 717 pregnant women extracted from the Bangladesh Demographic and Health Survey 1999–2000, this study identified that unwanted pregnancy is significantly associated with higher numbers of living sons ($P<0.001$), longer marital duration ($P<0.05$), exceeding desired family size ($P<0.001$), use of contraception ($P<0.01$), and breastfeeding practice ($P<0.05$). For mistimed pregnancy, higher age ($P<0.05$), breastfeeding practice ($P<0.01$), exceeding desired family size ($P<0.01$), pregnancy termination ($P<0.05$), and having last birth during last three years ($P<0.001$) were significant. Since unintended pregnancy is strongly associated with exceeding desired family size, a multidimensional approach may be needed through the family planning, health and educational sectors in Bangladesh to maintain desirable family sizes.

Introduction

Almost all women are at risk for unintended pregnancy throughout the reproductive years (Forrest 1994), which occurs in all socioeconomic strata of the society (Moos 2003; Brown and Eisenberg 1995). About half (48%) of all women aged 15–44 have experienced at least one unintended pregnancy sometime in their reproductive life (Moos 2003; Henshaw 1998). The incidence of unintended pregnancy, which includes both unwanted and mistimed pregnancies (Santelli et al. 2003; Brown and Eisenberg 1995), has long been used as a primary indicator of the state of reproductive health (Trussell et al. 1999). Unwanted pregnancies are those which occurred when the women did not want to have any further pregnancies at all (Brown and Eisenberg 1995). Reasons for unwanted pregnancies are: (1) people's growing desire to have smaller families; (2) the unmet need for family planning; (3) ineffectiveness of contraceptive methods; and (4) unwanted sexual relations (Langer 2002). Women who experience unwanted pregnancy are at a greater risk of complicated pregnancy outcomes, and their children are more likely to experience physical or psychological problems in infancy than those women with wanted pregnancies (Kroelinger and Oths 2000).

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In contrast, mistimed pregnancies are those that were wanted by the women at some time, but which occurred sooner than they were wanted. This may happen if (1) women who were hoping to space their births a certain distance apart conceived sooner than was hoped for due to contraceptive failure, and (2) women had intercourse without a contraceptive method despite the fact they did not hope to become pregnant (Brown and Eisenberg 1995).

Each year, globally 40–60 million women seek termination of an unwanted pregnancy under unsafe conditions (Rai and Dali, 2002). The consequences of unintended pregnancy are serious, imposing appreciable burdens on children, women, men, families (Brown and Eisenberg 1995) and their societies (Klima 1998). Both unwanted and mistimed pregnancies are known to be associated with numerous harmful behaviours and outcomes. For example, more than 50% of the unwanted and mistimed pregnancies ended in abortion (Henshaw 1998; Brown and Eisenberg 1995; Forest 1994), which is responsible for at least one in eight maternal deaths worldwide (Rai and Dali 2002). Some of the factors which are known to be associated with unintended pregnancies may include age, being unmarried, low income/economic status/poverty (Henshaw 1998; PRAMS GRAM 1996), maternal education, higher parity, (Gadow et al. 1998), nonuse of contraception at the time becoming pregnant, partner's feeling about the pregnancy, level of dependability and support from partner (Kroelinger and Oths 2000), barriers to accessing contraception, fears about using it, errors in use, lack of backup plans when errors in use occur, elective abortions, late entry to prenatal care, low birth weight, child abuse and neglect, behavioural problems in the offspring (Moos 2003), contraceptive failure, and rape (Klima 1998), among others.

Although unintended pregnancy is a worldwide problem (Klima 1998) and women carrying unintended pregnancies are considered vulnerable to various risk factors leading to poor obstetric and perinatal outcomes (Gadow et al. 1998), the issues of both unwanted and mistimed pregnancies receive little attention in the print and electronic media as compared to teenage pregnancy, nonmarital childbearing and abortion (PRAMS GRAM 1996; Brown and Eisenberg 1995). It is particularly true for Bangladesh, which is one of the most populous countries in the world, and where maternal mortality and morbidity are very high as compared to many other Southeast Asian countries like Bhutan, Indonesia, India, Sri Lanka and Thailand (Sein and Rafei 2002). However, this country has been trying relentlessly to achieve the replacement level of fertility mainly through the family planning programs. As a result the contraceptive prevalence rate has increased significantly, from about 8% in 1975 to about 54% in 1999–2000. The rising trend of contraceptive prevalence rate (CPR) is also associated with the fall in fertility, which declined markedly, from 6.3 births per woman in 1975 to 3.3 births per woman in 1999–2000. Despite such improvements, unplanned pregnancies are still common in Bangladesh. It is reported that if all unwanted births were avoided (which is about 1.1 per woman), the fertility rate in Bangladesh would fall from 3.3 to 2.2 children per woman (Nipport et al. 2001). Therefore, reduction in the rate of unintended pregnancy may be an important strategy to achieve the replacement level (2.1 children per woman) of fertility in Bangladesh. It is also noted that replacement level of fertility can be achieved if the current use of contraception is increased from 54 % to over 70% (Khuda et al. 1999).

Keeping the above-mentioned factors in mind, this article investigated some of the sociodemographic factors that might have some influence over both unwanted and mistimed pregnancies among ever-married women.

Methods

A total of 717 pregnant women, extracted from 10,544 currently married women of reproductive age of the Bangladesh Demographic and Health Survey (BDHS) 1999–2000, were identified as eligible for this study. The eligibility criterion was based on the pregnancy status during the survey. The response rate was 97% for women in the survey. The detailed methodology of sampling and data collection is given in the 1999–2000 BDHS report (Nipport et al. 2001).

The pregnant women were extracted using the question: (1) Are you pregnant now? The answer was coded as either *yes, no* or *not sure*. If she answered *yes*, she was considered as pregnant. (2)

Further, she was asked to respond the question, "At the time of becoming pregnant, did you want this pregnancy *then*, did you want to wait until *later*, or did you *not want* to have any (more) children at all?" The women who wanted the pregnancy *then* were considered under the *wanted group*, who desired pregnancy, but *later*, were considered under the *mistimed group*, and who did *not want* to have any (more) children were considered under the *unwanted group*.

Since unwanted and mistimed pregnancies should not be grouped into a single unintended category (Pulley et al. 2002), the cases of mistimed (unwanted) pregnancy are excluded to the logistic regression for unwanted (mistimed) pregnancy. The following variables have been used in the logistic regression model.

Dependent variable:
Whether pregnancy wanted or unwanted (if wanted = 0, unwanted = 1)
Whether pregnancy wanted or mistimed (if wanted = 0, mistimed = 1)
Independent variables (categorical):
Age of the women (10-24 years = 0, 25-34 years =1 , 35-49 years = 2)
Level of education (no education = 0, primary education = 1, secondary and above = 1)
Place of residence (urban = 0, rural = 1)
Region of residence (Barisal = 0, Chittagong = 1, Dhaka = 2, Khulna = 3,
Rajshahi = 4, Sylhet = 5)
Religion (non-Muslim = 0, Muslim = 1)
Own television (no = 0, yes = 1)
Marital duration in years (0-9 years = 0, 10-19 years = 1, 20 years and above = 2)
Number of living sons (no son = 0, 1 son = 1, 2 sons or more = 2)
Whether currently breastfeeding (no = 0, yes = 1)
Whether exceeded desire family size with present pregnancy (no = 0, yes = 1)
Whether ever used any contraception (no = 0, yes = 1)
Whether ever had terminated pregnancy (no = 0, yes = 1)
Whether discussed about family planning method with partner in the last year (no = 0, yes = 1)
Whether had given birth in the last 3 years (no = 0, yes = 1)

Results

Basic Characteristics of Pregnant Women

From Table 1 it is revealed that 62.9% pregnant women belonged to the age category 10–24. Among the respondents 40% had no education, while 31% had primary level of education. Three-fourths of the respondents were from rural areas and 90% were Muslim. Only 19% owned a television (TV). The marital duration was 0–9 years for 69.3% of the women. About one-third of the pregnant women experienced birth during last three years; one-fourth of the respondents exceeded their family size with that pregnancy. Use of contraception was 59.4% among the total women, with 19.3% experiencing terminated pregnancy. About 16% of the women reported breastfeeding.

Differential of Unwanted Pregnancy Rates and χ^2 Test

The rate of mistimed and unwanted pregnancy was 27.3% and 14.6% respectively (Table 1). The rate of unwanted pregnancy was highest in the highest age group (55.3% for 35–49), and lowest in the lowest age group (5.1% for 10–24). Education was negatively related with unwanted pregnancy. Marital duration indicated that 62.9% of pregnancy was unwanted when the marital duration was more than 20 years, whereas it was only 4.4% when marital duration was less than or equal to 9 years. Unwanted pregnancy was positively associated with number of living sons. The rate was extraordinarily high (53.0%) when the women had two or more sons as compared to women having one living son (15.9%) only. About 50.0% of the pregnancies were unwanted from those

who exceeded the reported number of ideal children. This rate was 20 times higher than those who did not exceed the ideal number of children. About one-fifth of the pregnancies were unwanted for the women who had ever used contraception. Unwanted pregnancy was also positively associated with number of births in the last three years from the date of the survey.

Table 1: Rates of Unwanted and Mistimed Pregnancies by Selected Socioeconomic and Demographic Characteristics of the Women

Characteristics	N	Unwanted (%)	Mistimed (%)	Characteristics	N	Unwanted (%)	Mistimed (%)
Overall	717	14.6	27.3				
Age:				**Education:**			
10-24	451	5.1	31.9	No education	284	23.2	23.9
25-34	228	26.8	21.5	Primary education	219	12.8	30.1
35-49	38	55.3	7.9	Secondary and above	214	5.1	29.0
χ^2=111.7,df=2,P<0.001				χ^2=33.7,df=4,P<0.001			
Place of residence:				**Region of residence:**			
Urban	167	13.2	30.5	Barisal	56	1.8	42.9
Rural	550	15.1	26.4	Chittagong	143	15.4	25.9
χ^2=1.3,df=2,P=0.535				Dhaka	202	15.8	25.7
				Khulna	93	11.8	33.3
				Rajshahi	125	18.4	26.4
				Sylhet	98	14.6	19.4
				χ^2=18.3,df=10,P=0.050			
Religion:				**Own television:**			
Non-Muslim	61	6.6	24.6	No	578	16.6	26.3
Muslim	656	15.4	27.6	Yes	138	6.5	31.9
χ^2=4.5,df =2,P=0.105				χ^2=9.4,df=2,P=0.009			
Marital duration in years:				**No. of living children:**			
0-9 years	497	4.4	30.6	Up to 2 children	573	5.2	29.1
10-19 years	185	33.0	21.1	3-4 children	102	45.1	26.5
20 years and above	35	62.9	14.3	5 and above children	42	69.0	4.8
χ^2=156.4,df=4,P<0.001				χ^2=221.1,df=4,P<0.001			
Number of ideal children:				**Number of son alive:**			
1-2 children	452	12.8	29.7	0	411	3.2	26.8
3-4 children	222	19.8	27.0	1 son	189	15.9	32.8
5 and above	16	6.3	6.3	2 sons and above	117	53.0	20.5
χ^2=12.1,df=4,P=0.017				χ^2=190.6,df=4,P<0.001			
Exceeded ideal number of children with this pregnancy:				**Ever had terminated pregnancy:**			
No	511	2.54	29.5	No	578	13.5	29.2
Yes	179	50.3	24.6	Yes	139	19.4	19.4
χ^2=246.2,df=2,P<0.001				χ^2=6.9,df =2,P=0.031			
Ever used contraception:				**Births in the last three years:**			
No	291	8.2	22.0	No	489	11.9	21.3
Yes	426	19.0	31.0	Yes	228	20.6	40.4
χ^2=30.4,df = 2,P<0.001				χ^2=49.6,df =2,P<0.001			
Currently breastfeeding:				**Have you discussed about FPM with partners in the last year:**			
No	601	12.5	24.3	No	455	14.1	25.5
Yes	116	25.9	43.1	Yes	261	15.7	30.7
χ^2=41.8,df = 2,P<0.001				χ^2=3.2,df=2,P=0.198			

Note: P = 2-sided significance level using χ^2 test statistic. Total frequency is not always 717 due to missing values and non-numeric answers.

The proportion of unwanted pregnancy was 25.9% for the women who reported breastfeeding at the time of survey, which was double those who were not breastfeeding then. Almost all the variables except place of residence, religion, and husband-wife discussion about family planning matters were significantly associated with pregnancy status by χ^2 test.

The results of the logistic regression analysis are presented in Table 2. Only six variables (education of women, marital duration, number of living sons, whether exceeded the number of ideal children, use of contraception, and currently breastfeeding) were significantly related with unwanted pregnancies. Odds ratios for marital duration indicated that the rate of unwanted pregnancies were 2.7 and 12.0 times higher for the women with marital duration 10–19 years and 20 years and above, as compared to women with marital duration less than or equal to 9 years. The odds ratio was 21 times higher for those who exceeded ideal number of children compared with those who did not exceed the ideal number of children. The ratio was 4.7 times and 2.3 times higher for women with two sons and more and one son respectively than those women without sons. The ratio of unwanted pregnancy was 3.8 times higher for women who had ever used contraception as compared to the reference category. Women who reported breastfeeding had 3.7 times higher odds ratio of unwanted pregnancies than the reference category.

Table 3 presents the percentage of women who exceeded the reported number of ideal children by some sociodemographic variables. The rate was significantly higher ($P<0.001$) for women who had no education (35.5%) than the women having education (20.0%). Similarly the rate is significantly higher ($P<0.001$) for those women who reported current breastfeeding (41.0%), ever used of contraception (32.70%), married for 20 years or more (82.9%), having two sons or more (75.7%) as compared to other categories of each variable.

Table 4 presents information about the last contraception method used by those who ever used contraception, causes of discontinuation of use in the last five years, and preferred contraceptive method for the future. Though there were 426 (59.4%) "ever" users among the total sample, only 396 responded about last method. The women were classified according to the last contraceptive methods. The Pill was the most common method among the pregnant women for all groups. Condom, injection, periodic abstinence and withdrawal were also reported.

Why did they discontinue contraception use in the last five years? The most frequent answer was that they wanted to become pregnant at that time. Among the unwanted and mistimed groups, important reasons were as follows: became pregnant (which means method failure), side effects, accessibility to methods, and husband disapproval.

Next each pregnant woman was asked to mention the preferable method of contraception which they intended to use in future. In response, 667 women responded; according to their responses, the Pill was the most frequently cited method over others. The answer "don't know" was the second highest, followed by injection and female sterilization respectively.

Finally an attempt has been made to examine which particular methods were responsible for method failure, side effects and so on (Table 5). The highest rate of method failure was found among periodic abstinence users, followed by withdrawal, condom and pill users respectively. Side effects were found highest among injection users, followed by pill users. All others reasons, such as husband disapproval, health concerns, limited accessibility, and pill users reported so on.

Discussion

The unwanted pregnancy rate was 15% in Bangladesh among the pregnant women in the survey. Unwanted pregnancy is not unique to Bangladesh, but is common all over the world. For example, unwanted pregnancies were 25% in India (Saha and Chatterjee 1998), 12.5% in Sri Lanka, 14.2% in Thailand, 6.5% in Indonesia (Sein and Rafei 2002), 9% in Zimbabwe (Mbizvo et al. 1997), 20% in Nigeria (Okonofua et al. 1999), 12.5% (PRAMS GRAM 1996) and 4% in USA (Hellerstedt et al. 1998), 37% in South America (Gadow et al. 1998) and 16.5% in Nova Scotia, Canada (Denton and Scot 1994). The substantial variation in unwanted fertility among countries may be caused by the variation in the degree of implementation of preferences, the effectiveness of contraceptive use,

Table 2: Multivariate Logistic Regression for Unwanted (Excluding Mistimed Pregnancy) and Mistimed (Excluding Unwanted Pregnancy) Pregnancies Using Some Selected Socioeconomic and Demographic Variables

Variable	Unwanted pregnancy OR (95% CI)[a]	Mistimed pregnancy OR (95% CI)[b]
Age:		
10-24 (RC)		
25-34	0.57 (0.17-1.88)	0.48 (0.24-0.97)*
35+	0.36 (0.04-2.97)	0.15 (0.02-0.95)*
Education:		
No education (RC)		
Primary education	0.61 (0.27-1.39)	1.32 (0.80-2.17)
Secondary and above	0.38 (0.12-1.21)	1.05 (0.59-1.86)
Place of residence:		
Urban (RC)		
Rural	0.47 (0.17-1.31)	0.91 (0.57-1.46)
Region of residence:		
Barisal (RC)		
Chittagong	2.13 (0.16-28.22)	0.59 (0.27-1.25)
Dhaka	2.30 (0.18-29.68)	0.60 (0.29-1.22)
Khulna	2.03 (0.14-30.27)	0.85 (0.39-1.87)
Rajshahi	2.59 (0.20-33.99)	0.67 (0.31-1.44)
Sylhet	2.06 (0.15-28.21)	0.58 (0.24-1.39)
Religion:		
Non-Muslim (RC)		
Muslim	1.29 (0.33-5.04)	1.45 (0.72-2.92)
Owned television:		
No (RC)		
Yes	0.92 (0.26-3.22)	1.60 (0.92-2.79)
Marital duration:		
0-9 years (RC)		
10-19 years	2.68 (0.88-8.11)	0.96 (0.45-2.07)
20 years and above	11.94 (1.45-98.08)*	3.56 (0.68-18.62)
Number of living sons:		
0 (RC)		
1 son	2.32 (0.92-5.89)	1.39 (0.86-2.24)
2 sons and more	4.67 (1.61-13.57)**	1.68 (0.76-3.74)
Breastfeeding at the time of survey:		
No (RC)		
Yes	3.68 (1.28-10.58)*	2.42 (1.31-4.49)**
Exceeded no. of ideal children with this pregnancy:		
No (RC)		
Yes	21.00 (8.83-49.95)***	2.71 (1.39-5.29)**
Ever used contraception method:		
No (RC)		
Yes	3.81 (1.65-8.81)**	1.70 (1.11-2.61)*
Ever had terminated pregnancy:		
No (RC)		
Yes	0.54 (0.22-1.32)	0.67 (0.39-1.15)
Ever had discussion about family planning method with husband:		
No		
Yes	0.98 (0.46-2.08)	1.15 (0.77-1.72)
Recode of last birth during last three years:		
No (RC)		
Yes	2.34 (0.97-5.04)	3.27 (2.05-5.21)***

Note: CI: Confidence interval, RC: Reference category. Simple contrast among different categories and Enter method were used.
aModel summary for unwanted pregnancy: -2LL: 219.2; Cox and Snell R square: 0.44; Nagelkerke R square: 0.69;
Omnibus tests of model coefficients: 286.1, df=22, P<0.001. Overall 90.3% of the valid 493 cases were correctly classified.
aModel summary for unwanted pregnancy: -2LL: 638.6;; Cox and Snell R square: 0.17; Nagelkerke R square: 0.23;
Omnibus tests of model coefficients: 106.1, df=22, P<0.001. Overall 73.53% of the valid 585 cases were correctly classified.
* P<0.05, ** P<0.01, *** P<0.001

Table 3: Percent of Women Exceeded Number of Ideal (Desired) Number of Children by Some Selected Variables

Characteristics	N (690)	Rate (%)
Education:		
No education	265	35.47
Having education	425	20.00
$\chi^2 = 20.34$, df = 1, P=0.000		
Currently breastfeeding:		
No	585	23.25
Yes	105	40.95
$\chi^2 = 14.52$, df = 1, P=0.000		
Ever use any contraception:		
Never used	271	15.50
Ever used	419	32.70
$\chi^2 = 25.34$, df = 1, P=0.000		
Marital duration:		
0-9 years	482	8.71
10-19 years	173	62.43
20 years and above	35	82.86
$\chi^2 = 253.35$, df = 2, P=0.000		
Number of alive sons:		
0	397	8.82
1	182	32.97
2 and more	111	75.68
$\chi^2 = 208.19$, df = 2, P = 0.000		

the rate of induced abortion, age at marriage, duration of breastfeeding, and frequency of sexual relations (Bongaarts 1997).

Although the χ^2 statistic showed many significant associations (Table 1) between pregnancy status and sociodemographic variables, most of them disappeared when logistic regression was applied (Table 2). Only a few of them were significantly associated with unwanted pregnancy. This study confirmed that (i) marital duration, (ii) number of sons, (iii) exceeding desired (ideal) number of children, (iv) ever terminated pregnancy, (v) ever used contraception, and (vi) currently breastfeeding were the significant determinants of unwanted pregnancies in Bangladesh.

The data (not shown) indicated that longer marital duration, higher age and lower educational level of women are represented by higher number of living children or higher number of sons. Since the women with a higher number of living children or number of sons are more likely to exceed the desired number of children, further pregnancy would be more likely to be unintended. Positive association between unintended pregnancy and number of children are also reported by other studies (PRAMS GRAM 1996; Denton and Scott 1994). Higher parity or close pregnancies were positively associated pregnancy termination (Thapa and Padhye 2001) and other abnormal outcome, including maternal death.

Women of low socioeconomic status are at greater risk of contraceptive nonuse and for contraceptive failure; thus they are also at greater risk of unintended conceptions (Forrest 1994). Denton and Scott (1994) reported that contraceptive failure was responsible for 13.5% of unintended pregnancies. However, effective use contraception depends on many factors. Education is one of the most important factors. A woman with higher education is more likely to use contraceptive methods, and is more health-conscious. Education increases the empowerment of women and increases the decision-making power in the family, which is the key to the rest of a woman's development and future (Rao 2001). It also increases the interrelationship between husband and wife, which ultimately helps them to make joint decisions regarding family size, contraceptive use and so on. Educated women have more opportunities (such as access to radio, TV, newspaper) to learn

Table 4: Distribution of Women by Last Method of Used Contraception, Causes of Discontinuation as Well as by Preferred Future Method of Contraception by Pregnancy Status

	Unwanted group	Mistimed group	Wanted group
Last method of contraception used by the ever users by pregnancy status of women (n = 396):			
Pill	45	71	114
Condom	2	18	28
Injection	12	15	19
IUD	0	0	3
Periodic abstinence	10	12	17
Withdrawal	2	9	13
Others	4	1	1
Total	75	126	195
Reasons for discontinuations of contraceptive methods in the last five years by pregnancy status of women (n = 381):			
Became pregnant	31	50	10
Wanted to become pregnant	2	18	136
Husband disapproved	3	4	9
Side effects	22	27	20
Health concerns	2	3	4
Accessibility	1	9	0
Inconvenient to use	2	3	0
Infrequent sex, husband away	2	1	2
Cost	1	2	0
Others	5	6	6
Total	71	123	187
Preferred future methods of contraception by pregnancy status of women (n = 667):			
Pill	27	76	167
Injection	21	36	51
Condom	0	3	12
Female sterilization	13	8	5
IUD	0	1	3
Norplant	4	2	3
Withdrawal	0	0	5
Don't know	32	58	125
Other	5	4	6
Total	102	188	377

about various contraception, including their advantages and disadvantages. They are also aware of the consequences of large family size. All factors together act to control the family size according to desire level.

Although Taylor and Cabral (2002) and Dye et al. (1997) found an inverse association between unwanted pregnancies and breastfeeding practice, this study failed to support their findings. Surprisingly, the data (Table 1) showed a higher rate of unwanted pregnancy among the women who were breastfeeding their children during the survey. Furthermore, this study showed that women who had ever used contraception were not necessarily less likely to have an unwanted pregnancy. This may be explained by the following reasons: (i) perhaps breastfeeding practice and "ever" use of contraception were not effective in reducing unwanted pregnancy in case of Bangladesh, or (ii) the rate of exceeding the ideal number of children (desire family size) was significantly higher for those women who had ever used contraception and who had been currently breastfeeding

(Table 3). Whether women exceeded the ideal number of children may be crucial because it showed the greatest impact on unwanted pregnancy by odds ratio (Table 2). Since a large portion of the women who reported the breastfeeding practice and ever use of contraception had exceeded ideal number of children, perhaps the effectiveness of breastfeeding and ever use of contraception disappeared, and therefore the main factor behind the associations of unwanted pregnancy with breastfeeding and ever use of contraception may be exceeding the ideal number of children, or (iii) these findings could also be the result of confounding factors.

In the case of ever use of contraception, method failure may also contribute in cases of unwanted pregnancy. The failure rate was substantial (18%) among the Pill users, the most common method of contraception in Bangladesh. Many women were practicing periodic abstinence and withdrawal as a contraception method, which showed high rate of method failure (Table 5). It is reported that among the women who became pregnant due to contraceptive failure that 68% defined the pregnancy as unintended (Santelli et al., 2003).

Table 5: Reasons of Discontinuation of Contraceptive Methods by Method of Contraception

Reasons	Pill	Condom	Injection	IUD	PA	Withdrawal	others
Wanted to become pregnant	93	25	9	3	14	11	1
Method failure	40	15	4	0	19	9	4
Side effects	46	1	21	0	0	0	1
Husband disapproved	9	2	2	0	2	1	0
Health concerns	8	0	1	0	0	0	0
Accessibility	7	2	1	0	0	0	0
Inconvenient	5	0	0	0	0	0	0
Infrequent sex/husband away	3	0	0	0	1	1	0
Cost	3	0	0	0	0	0	0
Other	9	2	6	0	0	0	0
Total	223	47	44	0	36	22	6

What kind of strategies to reduce the incidence of unwanted pregnancy should be implemented in Bangladesh? First, since strongest association ($P<0.001$) was found for those women who exceeded desired family size, synergistic efforts of family planning, health and educational programs are an extreme need in Bangladesh to motivate the women for using contraception effectively so that they can limit the number of children according to their desire. As the average number of desired children was around 2.5, which is close to replacement level of fertility, it is not important to counsel all the women to limit their children at 2, but it is very much important to help and motivate women empathetically so that they can not exceed their desired family size.

Second, since shortcomings of contraceptives and family planning delivery systems are major reasons for unwanted pregnancy and unsafe abortion in Third World countries (Kabir 1989), and since family planning services are acknowledged as one of the most cost-effective programs to prevent unwanted pregnancy in all socioeconomic groups (PRAMS GRAM 1996), family planning and health programs should ensure increasing access to the contraception with minimum barriers for all women and should provide all other services to fulfill their multiple reproductive health needs. Higher parity women should be motivated to adopt a permanent method. Special emphasis also should given to the Pill (as a most preferable method) users and others for which failure rate is high.

Third, creating more facilities for women's education may be another contributing factor in reducing unwanted pregnancy. Increasing education of women will help delay their age at first marriage, through which marital duration can be reduced and effective contraceptive use can be increased (method failure can be reduced), and as a result women will have lower parity.

We should remember that in limiting the number of unintended pregnancies, three vital things

could be achieved, at least partially: (i) number of children could be limited according to desire, (ii) the gap between actual fertility rate and replacement level of fertility could be minimized, and (iii) the number of hazardous terminated pregnancies or abortions could be reduced. In short, such activities are needed through which women can complete their reproductive age with their desired number of children. Moreover, because of the serious consequences of unwanted pregnancy, every society should adopt a new social norm under which all pregnancies would be intended; i.e., they should be consciously and clearly desired at the time of conception (Brown and Eisenberg 1995).

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An Assessment of Parent-Child Communication on Sexuality in Lagos, Nigeria

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Abstract

This study is the first phase of a project designed to help parents acquire skills necessary for comfortable and effective communication about adolescents' sexuality. It assessed parent-child communication on sexuality among the in-school adolescents in Lagos, Nigeria. It was observed that a high proportion of the adolescents interviewed receive information on sexuality from friends and the mass media and also communicate more with their friends on sexuality than with their parents.

Introduction

Adolescence is a period of transition from childhood to adulthood, and as adolescents prepare to enter adulthood, they face enormous challenges. These challenges include coping with the physical, emotional and social changes that accompany this period of transition from childhood to adulthood and inadequate access to appropriate information, education and services to meet their peculiar needs during this transitional period. Although many young people are unprepared to face these challenges, the way they respond to them now can affect the rest of their lives. Adolescents who engaged in effective communication with their parents on sexuality issues were more likely than others to delay initiating sexual intercourse (Steinberg 2001).

Premarital sex is relatively common in many parts of sub-Saharan Africa, such as in Nigeria, where studies have shown that more than 20% of girls have had sex by age 15, while almost 50% have had sex by age 16, and the use of contraceptives is low (Ladipo et al. 1983). This sometimes results in unwanted pregnancies, unsafe abortions, sexually transmitted infections (STIs), including human immunodeficiency virus (HIV), acquired immune deficiency syndrome (AIDS) and death. Although most parents want young people to know about abstinence, contraception, and how to prevent HIV and other STI, they often have difficulty communicating about sexuality.

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Inadequate knowledge about sexuality can be caused by parents' insistence on obedience and absolute abstinence from sex and their delay in talking about sexuality. Initiating conversations about the facts of life may be difficult for some parents because they did not grow up in an environment where the subject was discussed, while some parents may be afraid they do not know the right answers or feel confused about the proper amount of information to offer. Most attempts by parents to impart sexuality information to young people tend to be in a "top down" communication style (Yowel, 1997). Yowel stated that this denies the teens the opportunity to discuss their own thoughts, feelings and desires or to draw links between their own and their parents' perspectives. Some parents present sexuality in a negative way that their children do not find credible, compared to the fantasy their peers tell them about the issue (McCauley and Salter 1995).

At school, adolescents also lack access to the necessary educational processes with decision-making skills that can lead to healthy sexuality, thereby creating a wide gap between the information and services they ought to have and what actually is delivered to them (McCawley and Salter 1995; NGTF 1997). This study assessed the level of parent-child communication on sexuality among the in-school adolescents in Lagos, Nigeria. It is the first phase of a larger project designed to help parents acquire skills necessary for comfortable and effective communication about adolescents' sexuality and reproductive health in Nigeria.

Methodology

Study Population

Structured questionnaires with multiple-choice responses and skip patterns were administered to 300 in-school adolescents from four randomly selected secondary schools in Lagos Mainland Local Government Area (LGA) of Lagos State, Nigeria. A multistage random sampling technique was used to select the 300 respondents. The first stage involved a random selection of four secondary schools from a total of 12 secondary schools in the LGA, following which five classes were randomly selected from each of the four secondary schools. Daily attendance registers of students from the five randomly selected classes were used to select 15 students from each of the classes, yielding a total of 75 students from each school.

Data Analysis

The quantitative data from the survey was analyzed using the Epi Info 6.0 software. Prior to the stage of analysis, the questionnaires were checked by the interviewers for completeness and later cross-checked by the supervisors. This was done in order to prevent error in the data entry and guarantee high precision and accuracy in the results of the analysis. Moreover, univariate and bivariate analyses of the data were carried out through the simple frequency tabulation of all the variables and the crosstabulation of some important dependent and independent variables. Also, multivariate analysis of the data was done in order to ascertain the effects of two or more predictor variables on relevant outcome variables.

Results

The students' ages ranged between 10 and 16 years and are made up of 149 (49.7%) males and 151 (50.3%) females. One hundred and eighty-one of them are Christians, 113 are Muslims, while six practice the indigenous religion. Their parents' educational status ranged from no education to postsecondary education, while their occupations ranged from petty trading to civil service. Two hundred and forty-five (81.7%) of the parents are married, 26 (8.7%) separated, 13 (4.3%) divorced, while 16 (5.3%) are single parents and the average number of siblings in all the families is six. While 207 (69%) of the pupils live with their parents, 33 (11%) live with their mothers, 16 (5.3%) live with their fathers, 27 (9%) live with married guardians and 17 (5.7%) live with unmarried guardians.

Among the 300 respondents, 136 (45.3%) have discussed sexuality with their parents/guardians, out of which 82 (27.3%) respondents were males and 54 (18%) were females, while 164 (54.7%), made up of 90 (30%) females and 74 (24.7%) males, have not discussed sexuality with either their parents or guardians before. Out of the 136 respondents who have discussed sexuality with their parents/guardians, 76 (55.9%) of them had the discussions with their fathers/male guardians, while 60 (44.1%) discussed with their mothers/female guardians. When asked who initiated the discussions, 98 (72.1%) of the 136 respondents said it was their parents/guardians, and 38 27.9%) said they had initiated the discussions with their parents/guardians. Those that had not discussed sexuality with their parents/guardians gave the following reasons: 52 (31.7%), I do not know what to ask; 50 (30.5%), I am afraid to ask; 29 (17.7%), it is not yet time to ask such questions; 25 (15.2%), my parents/guardians are too harsh; 8 (4.9%), my parents/guardians travel a lot.

The respondents were further asked if they had discussed sexuality with someone other than their parents or guardians before. One hundred and eighty eight (62.7%) [116 (38.7%) males and 72 (24%) females] stated that they have discussed sexuality with someone other than their parents or guardians, 62 (20.7%) said that someone discussed it with them, while 50 (16.6%) had not discussed it with anyone before. The respondents' main sources of information on sexuality were identified as follows: 121 (40.3%) from friends, 106 (35.3%) from the mass media, 68 (22.7%) from parents/guardians and 5 (1.7%) from teachers.

Of the 151 female respondents, 80 (53%) disclosed that they have one boyfriend each, 32 (21.1%) have more than one boyfriend, while 39 (25.8%) have not had any. Out of the 149 male respondents, 84 (56.4%) disclosed that they have one girlfriend each, 30 (20.1%) have more than one girlfriend, while 35 (23.5%) have not had any before. Among the 112 female respondents with one or more boyfriends, 46 (41.1%) disclosed engaging in sexual relationships with their partners. The 114 males with one or more girlfriends, 62 (54.4%) also disclosed engaging in sexual relationships. Of the 46 and 62 sexually active female and male respondents respectively, 32 (69.6%) females and 45 (72.6%) males mentioned that they use condoms as a form of contraceptive. However, 122 (40.7%) out of the 300 respondents mentioned the use of condoms as a contraceptive and 82 (67.2%) of the 122 respondents got to know about condoms through the mass media, while 40 (32.8%) knew through their friends. One hundred and twenty nine (43%) of the 300 respondents mentioned age 15 as the appropriate age to engage in sexual activity, 86 (28.7%) mentioned 20 years as the appropriate age and 85 (28.3%) of them said they did not know the appropriate age.

Discussion

In this study, it was observed that about 136 (45.3%) of the 300 respondents have discussed sexuality with either their parents or guardians. This is an advancement over what used to be the norm in a typical southwestern state of Nigeria, where parents are wary of discussing sexuality with their wards due to their religious inclination or fear that such discussions may elicit adventurous tendencies from the adolescent, thereby promoting sexual activities among the adolescents (Langhaug et al. 2003). It was also observed that more males discuss sexuality with their parents/guardians than do females and more males also admitted to having sexual partners and being sexually active. This is in agreement with the observations made by Jegede and Odumosu (2003), who stated that this could be related to the beliefs of parents who still see the discussion of sexuality as a taboo and a reflection of male dominance.

The study also observed a communication gap between the parents and their adolescent children, as a high proportion of the respondents depend on friends and the mass media for information on their sexuality. This could lead them to receiving and also passing on wrong information amongst peers and giving in to peer group pressure since they lack appropriate knowledge and beliefs about sexuality and necessary life skills. One hundred and eight (36%) out of the 300 respondents disclosed that they are sexually active, while 62 (20.7%) of the sexually active ones stated that they have more than one sexual partner. The number of the sexually active ones may likely be higher than these due

to the fact that adolescents in Nigeria are still not used to opening up on their sexuality to people, especially adults, other than their peers. The likely danger in this is that they would be closed to information on sexuality, thereby limiting their knowledge and making them to be prone to STIs, including HIV and unwanted pregnancies.

Use of a condom was the only contraceptive method mentioned by 40.7% of the respondents. The mass media and friends were identified as the only sources of this information. It is important to note that only 77 out of the 108 sexually active males and females with one or more sexual partners use condoms as a contraceptive method . The implication of this is that the sexually active ones stand the risks of contracting and spreading STIs, including HIV. Taffa et al. (2003) also observed in Addis Ababa that though young people differed in their sexual risk-taking, they were equally uninformed on reproductive health matters related to puberty and sexuality.

Programs seeking to promote reproductive health of adolescents should take into account the various channels through which these young people currently obtain sexuality information, and strive to tap into and strengthen the full range of these channels. Increased involvement of parents in providing sexuality information to adolescents seem indispensable; hence, youth-oriented reproductive health programs, which will involve and encourage the parents on the need for effective communication between them and their adolescent children should be implemented by governmental and nongovernmental organizations. This will reduce the prevalence of sexuality and reproductive health problems among adolescents, and enable healthy development of adolescents, guiding them against increased cases of STIs, HIV and unwanted pregnancies.

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Morbidity Profile, Prescribing Patterns and Working of the Community Drug Programme in a Health Post in Western Nepal

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Abstract

The study was carried out at the Naudanda Health Post over a two-month period (July 15, 2000, to September 15, 2000). The objectives were to obtain information on the demography of patients, morbidity, drug-prescribing patterns and the working of the Community Drug Programme. Acute respiratory infections were the most common illness. Paracetamol was most commonly prescribed and 80.6% of the drugs prescribed were essential drugs.

Introduction

According to the institutional framework of the Ministry of Health, Nepal, the Sub Health Post (SHP) functions as the first contact point for basic health services (Department of Health Services 2000). However many patients directly go to the Health Post (HP) for their health care needs. At the beginning of the year 1998, there were 3,195 SHPs, 747 HPs, 120 Primary Health Care Centres (PHCC) and 17 Health Centres in Nepal. The Naudanda HP is situated in the Kaski district of Western Nepal. There are two PHCCs, 12 HPs and 34 SHPs in the district. A HP has two or three SHPs under it. Three or four HPs are under a PHCC. In Nepal, health assistants (HAs) usually man the HPs. HAs undergo an 18-month course after completing their school education with the last three months spent attached to a HP.

Baksaas and Lunde (1986) and Pradhan et al. (1988) have stressed the importance of drug utilization studies in evolving a comprehensive drug policy. The quality of life of the rural population can be improved by enhancing standards of medical treatment at different levels of the primary health care system. Setting standards and assessing the quality of care through performance review should be a part of daily clinical practice (Patterson 1986). The study of prescribing patterns seeks to monitor, evaluate, and if necessary suggest modifications in prescribing patterns of the practitioners to make health care rational and cost effective.

In Nepal absence of medicines in the Health Posts continues to be a major problem (UNDP Nepal 2002). To redress the shortage, the Community Drug Programme (CDP) was introduced (Department of Health Services 2001). Under this programme, His Majesty's Government (HMG) through the local self-governing bodies, provides a fixed amount (seed money) to the HPs to buy essential medicines. The HP sells these drugs to the patients and recoups the expenses. The money so obtained is used to buy further medicines and continue the CDP. The CDP is now operational in 250 health facilities throughout the country. Essential drugs are available throughout the year and the replenishment mechanism for drugs is working properly.

The objectives of the study were to:

1. Obtain information on the age and sex profile of the patients being treated at the Health Post;
2. Study the overall morbidity and the sex and age-wise morbidity pattern;
3. Obtain information on the drug-prescribing patterns, the rationality of therapy and the average cost per prescription; and
4. Gain an insight into the working of the CDP in the Naudanda Health Post.

Methods

All drug prescriptions from the Naudanda Health Post over a two-month period (July 15, 2000, to September 15, 2000) were collected. The data collected were entered into a predesigned proforma for further analysis. The age, sex and the diagnosis of the patient were noted. The morbidity pattern during the study period was determined. Sex and age differences in the morbidity pattern were analyzed using the χ^2 test ($P<0.05$).

The drugs prescribed, the duration and frequency of administration were recorded. Information on the number of drugs prescribed by generic names and from the essential drug list of Nepal (Department of Drug Administration 2002) and from the World Health Organization (WHO) model list of essential drugs (WHO Drug Information 1999) was collected.

The cost of the drugs and procedures undergone by the patient were calculated. In the Health

Post drugs were available from two sources: the government supply and the CDP. Information on the functioning of the CDP in the Health Post was obtained by interviewing the AHW in charge and looking into the Health Post Pharmacy records.

The rationality of prescriptions was determined by the authors in consultation with doctors of the Department of Medicine, Manipal Teaching Hospital and doctors working in peripheral Health Posts. To determine whether the AHWs were practicing what they were taught, we consulted two textbooks for AHWs which detailed the treatment to be prescribed for different disease conditions (Department of Drug Administration 1993; Health Learning Materials Centre 1994).

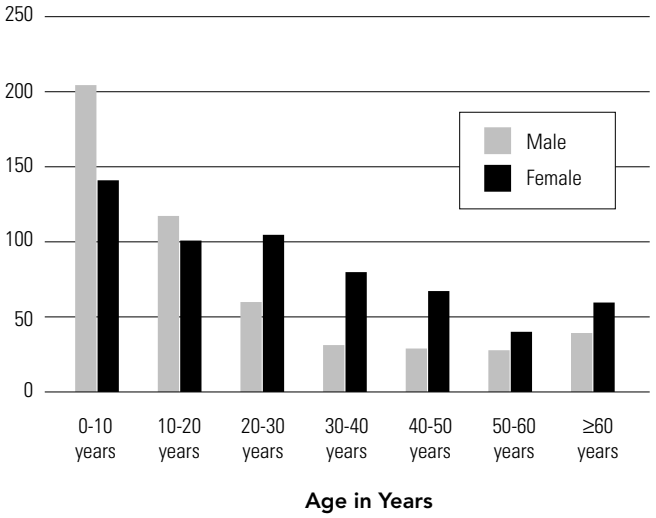
Sex and age difference in the prescribing patterns were analyzed using the χ^2 test ($P<0.05$).

Results

The Naudanda Health Post serves a population of 36,009 in the Kaski district of Western Nepal. A total of 1,186 patients were treated during the study period. Five hundred and fifty one patients (46.4%) were male, while 635 were females. The age and sex distribution of the patients is shown in Figure 1.

Acute respiratory infection (ARI) was the commonest illness for which treatment was sought [149 out of the 1186 patients (12.6%)]. The other common illnesses were wounds and wound infection in 120 patients (10.1%), acid peptic disease (APD) in 88 patients (7.4%), diarrhea/dysentery in 78 patients (6.6%) and worm infestation in 66 patients (5.6%). The sex-wise morbidity pattern is shown in Table 1. ARI, wounds and diarrhoea/dysentery were significantly more common in males while APD and neuritis were more common in women ($P<0.05$). ARI, diarrhea/dysentery and worm infestation was more frequent in the younger age group. APD, chronic obstructive pulmonary disease (COPD), hypertension and arthritis were more common in the older age groups. Under-fives constituted 19.3% of the patients. ARI and diarrhea/dysentery were the commonest illnesses in under-fives, accounting for 34.5% and 20.5% of the total illness seen in under-fives. Wounds, worm infestation and skin diseases were also common.

Figure 1: Age and Sex Distribution of the Patients



Mean ± SD number of drugs per prescription was 1.93 ± 1.16. Two thousand two hundred and eighty-nine drugs were prescribed during the study period. Paracetamol was the commonest drug prescribed, accounting for 303 out of the total of 2289 drugs (13.2%). Other common drugs used were amoxicillin [231 prescriptions (10.1%)], sulfonamides [216 prescriptions (9.4%)], vitamin B

complex [176 prescriptions (7.7%)] and antacids [143 prescriptions (6.2%)]. Out of the total of 2,289 drugs prescribed in the Health Post during the study period, 1,845 (80.6%) were prescribed from the essential drug list of Nepal and 1843 (80.5%) were prescribed from the WHO list of essential drugs. Combination preparations accounted for 10% of the total prescriptions. Seven hundred and eighty nine out of the 2,289 drugs (34.5%) were prescribed by brand names.

Table 1: Sex-wise Morbidity Profile of Patients Visiting the Naudanda Health Post During the StudyPeriod

Disease condition	Males (n=551) Number (percentage of total number of male patients)	Females (n=635) Number (percentage of total number of female patients)
ARI	88 (16)*	66 (10.4)
Wound	81 (14.7)**	46 (7.2)
Diarrhoea/ dysentery	74 (13.4)△	60 (9.4)
PUO	29 (5.3)	22 (3.5)
Worms	24 (4.3)	31 (4.9)
APD	19 (3.4)	73 (11.5) △△
Others	236	337

*χ^2 =8.1, P<0.05 **χ^2 = 17.1, P<0.05
△ χ^2 =4.7, P<0.05 △△ χ^2 = 26.9, P<0.05

Mean ± SD cost per prescription was 34.7 ± 17 Nepalese rupees (0.46 ± 0.23 US dollars). The cost of the procedures undergone by the patient and of the outpatient ticket was included in the calculation. An outpatient ticket costs Rs. 2 (1 US dollar = 75 Nepalese rupees). The charges for injection, tooth extraction and wax removal are Rs. 5, Rs. 35 and Rs. 25 respectively. For dressing a wound, the cost is Rs.5, while for stitching a wound or incising an abscess followed by dressing, the cost is Rs.10. If only the cost of drugs was taken into account, the mean ± SD cost per prescription was 28.2 ± 15.6 Nepalese rupees (0.37 ± 0.2 US dollars).

Oral contraceptives, drugs used for the treatment of tuberculosis and leprosy, iron tablets, oral rehydration salts (ORS) and vitamin A are supplied free of cost to the patients. There are two sources from which the Health Post receives the medicines. HMG supplies drugs worth Rs. 25,000 to the health centre around the end of July. These drugs last for about two months. After that, the drugs are obtained from the CDP (Department of Health Services 2001; *The Himalayan Times* 2002). The cost price of drugs supplied under the CDP is slightly more than that of the government supplied drugs. If a drug is not available in the Health Post Pharmacy, then it has to be obtained from outside. Buying drugs from outside entails a higher cost to the patient. In our study 98% of the drugs prescribed were available from the Health Post Pharmacy.

The prescribing frequency of chosen drug groups versus sex is shown in Table 2. Antimicrobials, topical preparations and ORS were more commonly prescribed to male patients. Vitamins and antiulcer drugs were more commonly prescribed to female patients (P<0.05).

Table 3 shows the analysis of prescribing frequency versus age. Prescribing frequency of antimicrobials declined with increasing age. There was no clear trend seen in the prescribing of NSAIDs. The prescription of vitamins and antiulcer drugs increased with increasing age.

Table 2: Sex-wise Distribution of Drug Use

Class of Drugs	Males Total number of drugs (% of total drugs used in males)	Females Total number of drugs (% of total drugs used in females)
Antimicrobials	413 (41.3)*	422 (35.2)
NSAIDs	278 (27.8)	310 (25.8)
Vitamins	53 (5.3)	112 (9.3) **
Topical preparations	63 (6.3)△	41 (3.4)
Anthelminthics	46 (4.6)	56 (4.7)
Antiulcer drugs	38 (3.8)	105 (8.75) △△
ORS	42 (4.2)¶	30 (2.5)
Antiasthma drugs	7 (0.7)	13 (1.1)
Others	99	161
Total	1039	1250

*χ^2 =8.79, P<0.05, **χ^2=12.7, P<0.05
△ χ^2=10.1, p<0.05, △△ χ^2=11.5, p<0.05
¶ χ^2=5, p<0.05

Table 3: Age-wise Distribution of Drug Use

Age Groups (years)	Drug Groups No. of drugs (percentage of total drugs used in the particular age group)						
	Antimicrobial	NSAIDs	Topical preparations	ORS	Vitamins	Anthelminthics	Antiulcer
0-10	334 (49.1)	143 (21)	40 (5.9)	48 (7)	13 (1.9)	35 (5.1)	11 (1.6)
10-20	164 (38.1)	131 (30.4)	23 (5.3)	9 (2.1)	28 (6.5)	31 (7.2)	18 (4.2)
20-30	115 (35.9)	94 (29.4)	17 (5.3)	2 (0.6)	34 (10.6)	11 (3.4)	29 (9.1)
30-40	73 (33.3)	58 (26.5)	5 (2.3)	8 (3.6)	23 (10.5)	10 (4.6)	21 (9.6)
40-50	63 (31.3)	62 (20.6)	6 (3)	2 (1)	20 (9.9)	5 (2.5)	21 (10.4)
50-60	35 (26.1)	37 (27.6)	5 (3.7)	1 (0.7)	21 (15.7)	5 (3.7)	16 (11.9)
≥60	53 (24.7)	63 (29.3)	9 (4.2)	3 (1.4)	28 (13)	5 (2.3)	26 (12.1)
Total	837	588	105	73	167	102	142

Discussion

Over the last ten years in Nepal, physical access to health institutions has improved dramatically. SHPs have been established in Village Development Committees (VDCs) and a survey in 1996 found 69% of households to be within an hour's walk from a health care institution (Central Bureau of Statistics, 1997). However, only 8% of those seeking health care were content with the services

they received (National Planning Commission 1998). Lack of medicines was stated to be a reason for dissatisfaction with the health services by 59% of patients and 84% of health workers.

CDP was first initiated by the WHO in 1982–86 in 18 districts of Nepal to overcome the shortage of drugs in health centres (Department of Health Services 2001; *The Himalayan Times* 2002). However, actual program implementation activities were seriously carried out only from 1996–97. The Revolving Drug Fund (RDF) for the replenishment of drugs is in successful operation in most of the health facilities in Kaski district. A National Policy for Drug Financing Scheme has been drafted and it is planned to be the guiding policy for all drug schemes in Nepal. For the Naudanda Health Post, seed money of 12,000 Nepalese rupees (160 US dollars) was given by the VDC in 1997. The seed money was utilized to buy medicines. Tenders are called for the supply of the medicines and the lowest bid is accepted. Medicines for the pediatric age group are given greater emphasis. Under the CDP drugs are bought four times a year. The HP sells the drugs to the patient and recoups the money. The CDP has successfully overcome the shortage of drugs in the Naudanda HP and in only 2% of cases did the patients have to buy drugs from outside. The resources mobilized are being used to improve the facilities in the HP and to subsidize services for the poor and the needy.

Lack of community support due to noninvolvement of the recipients of health care in the planning and delivery of health services is a major problem in Nepal (UNDP Nepal 2002). A committee of eight individuals has been formed to oversee the working of the Naudanda HP. The Health Post in-charge and the pharmacist are represented and also five elected members of the VDC. There is a government representative on the committee. Two members are women. This is especially important, as women and children are major recipients of health care services in Nepal. The *Local Self-Government Act*, 1999, envisages a significant role for locally elected bodies in the management of health institutions up to the level of the District Hospital. Devolution of power and management to the local bodies has been achieved to a substantial degree in the Naudanda HP.

The average number of drugs per prescription is an important index of the scope for review and educational intervention in prescribing practices. The mean ± SD number of drugs per prescription in our study was 1.93 ± 1.16. In a study in Primary Health Care Centres in Taiwan, the average number of drugs per prescription was 4.3 (Lai et al. 1995). Our results are comparable to the results from an Indian study where the mean ± SD number of drugs was 1.99 ± 0.7 (Srishyla et al. 1995).

The five most common illnesses for which treatment was sought in our study were ARI, wounds, APD, diarrhea and worm infestation. These are disease of poverty and are more common in developing countries with overcrowding and poor socioeconomic development. In the Taiwanese study (Lai et al. 1995) the most common illnesses encountered were ARI, skeletal and joint disease, hypertension and APD.

Under-fives account for a substantial proportion of the morbidity in Nepal. Diarrhoea and ARI were the most common illnesses seen in this age group. The incidence in the two-month study period of diarrhea/1,000 children (<5 years) was 205, and the incidence of ARI/1000 children (<5 years) was 345. The national figures for the year 2055/56 BS (1998/99 AD) were 144 and 172 (Informal Sector Research and Study Centre 2001). One of the reasons for the discrepancy was that the national figures were computed for the whole year, whereas our values were calculated from the data for only a two-month period. Seasonal factors may play a major role in the pathogenesis of these diseases.

Thirty-four percent of the drugs were prescribed by brand names. In an Indian study, only 3.5% of the drugs were prescribed by brand names (Kuruvilla et al. 1994). However, most of the brand names used were those of the public sector drug companies, Royal Drugs and Sajha Drugs. These drugs are available in the HP Pharmacy and so brand-name prescribing did not increase the cost of drugs to the patient. Out of the total of 2,289 drugs prescribed in the HP during the study period, 1845 (80.6%) were prescribed from the essential drug list of Nepal and 1843 (80.5%) were prescribed from the WHO list of essential drugs. Availability of these essential drugs in the Health Post Pharmacy entailed savings in terms of both money and time to the patients.

The average cost per prescription was 34.75 ± 17.04 Nepalese rupees. If only the cost of drugs was included, the average cost per prescription was 28.16 ± 15.6 Nepalese rupees. In a study in India, the mean ± SD cost per prescription was 8.8 ± 8.6 Indian rupees (0.18 ± 0.179 US dollars) (Kuruvilla et al. 1994). Because of the increase in the cost of drugs since the study was carried out, direct comparison of the results is difficult. The annual per capita income of Nepal is around Rs. 16,500 (US dollars 220). The average individual monthly income is around Rs. 1,400 and the treatment could be afforded by the majority of the individuals. For the people unable to afford the treatment, there is a system of partial or complete waiver of treatment costs.

Sixty-nine out of the total of 1,186 prescriptions (5.8%) were irrational. The Department of Health, HMG, has given guidelines for the diagnosis and treatment of common diseases and the AHWs in the health centres broadly followed these guidelines. Common irrationalities seen were use of a combination of antibiotics having similar antimicrobial spectrum for the treatment of sexually transmitted diseases (STDs) and pelvic inflammatory disease (PID), use of antibiotics in the treatment of pyrexia of unknown origin (PUO) without investigating for the causative organism and use of a combination of antimicrobials to treat diarrhea and dysentery.

Establishment of basic diagnostic facilities in the PHCCs and HPs and establishing a system of referral for more specialized investigations are required. Naudanda Health Post is accessible by an all-weather road, but other centres, Health Posts and Sub Health Posts may not be so accessible, and getting samples in time and sending reports may be difficult. Strengthening the CDP further to ensure that the Health Posts are well stocked with drugs at all times is also important.

Studies of prescribing patterns and drug utilization studies in the remote areas of Nepal are urgently required. These studies are being planned by the Departments of Community Medicine and Pharmacology and will be taken up in the near future.

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Modes of Delivery and Delivery Assistance in Rural Bangladesh

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Abstract

Objectives: This paper employs statistical methods to identify the factors associated with modes of delivery and delivery assistance in rural areas of Bangladesh. The principal objective of this paper is to suggest various policy options on the basis of study findings in order to provide guidelines to improve the overall delivery-related morbidity conditions in Bangladesh.

Methods: This study analyzes data from a followup study conducted by the Bangladesh Institute of Research for Health and Technologies (BIRPERHT) on maternal morbidity in rural Bangladesh in 1993. A total of 1020 pregnant women were interviewed in the followup component of the study. For the purpose of this study, we selected 993 pregnant women with at least one antenatal followup.

Results: It is observed that the mode of delivery is complicated (assisted or destructive) if the pregnancy is either first or fifth or higher order and if bleeding occurred during the antenatal period. More educated respondents, high-risk pregnancies, pregnancies with past history of anemia and respondents who reported marriage at a relatively higher age receive assistance from trained personnel at a significantly higher proportion. Some of the important findings are: (1) first pregnancy or fifth or higher prior pregnancies and hemorrhage during pregnancy increase the risk of assisted or destructive modes of delivery; and (2) first or fifth or higher prior pregnancies are more likely to seek assistance from trained health personnel; similarly, regular antenatal visits and past history of anemia are also positively associated with seeking assistance from trained personnel. However, still there is a substantial proportion of women who remain at risk of complicated deliveries assisted by untrained personnel, posing a formidable challenge to policymakers.

Conclusion: The results indicate several policy options: (1) the high-risk group, first or fifth or higher pregnancies, need special care and the existing health management system may be strengthened to create awareness among potential mothers for seeking appropriate measures from the beginning of pregnancy; (2) antenatal followup can be emphasized for high-risk pregnancies, and for respondents with a past history of anemia and other complications, a realistic referral system can be developed; (3) the campaign for increased age at marriage and increased age at first birth needs to focus the health

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issues more extensively; and (4) education for women needs to be given very high priority in order to bring about a lasting impact on the overall health condition of women.

Introduction

Every pregnancy involves some risks, and the risks of pregnancy can be reduced to a great extent through appropriate measures throughout the periods of antenatal, delivery and postnatal care. The awareness of pregnant women, their relatives and utilization of healthcare facilities can contribute to reduction of maternal morbidity and maternal mortality. It is estimated that about 500,000 women die annually due to pregnancy-related complications, of which 99% of these mortalities occur in developing countries (Royston and Armstrong 1989). The leading causes of mortality, morbidity and disability in developing countries among women of reproductive age are associated with complications during pregnancy and delivery (World Bank 1993). A comparison between pregnancy-related deaths in developing and developed countries shows that the risk of dying is 40 times higher in developing countries than that in developed countries.

The maternal mortality rate in Bangladesh has been historically high. However, the estimates are not based on representative data from the whole country. The maternal mortality rate that was estimated from a hospital-based study in selected urban areas as high as 20 per thousand live births in 1950s (Chen, Gesche et al. 1974). However, the rate was thought to be 40 per thousand live births during 1962–65. It is surprising that according to two other studies (1968–70), based on a followup survey in a rural area (Matlab) of Bangladesh, the maternal mortality rate was in the range of 5.7–7.7 per thousand (Chen, Gesche et al. 1974). Akhter et al. (1996) reported that the maternal mortality rate was 4.3 per thousand live births.

Several studies demonstrated the relationships between maternal morbidities and maternal mortality and the factors associated with both (Fortney and Smith 1999; Jejeebhoy 1997; Okolocha, Chiwuzie et al. 1998). The information on the maternal morbidity, however, is very scanty in a country like Bangladesh. According to Rochat et al. (1981), a large proportion (about one-fourth) of all pregnancy-related deaths occur in Bangladesh due to induced abortion (Okolocha, Chiwuzie et al. 1998). It has been observed that the major causes of maternal deaths in Bangladesh are eclampsia, septic abortion, postpartum sepsis and obstructed labor (Chen, Gesche et al. 1974; Rochat, Jabeen and Rosenberg 1981; Khan, Jahan and Begum 1986; Koenig, Fauveau et al. 1988; Fauveau, Wojtyniak et al. 1989). Most of the pregnancies are either not attended at all or attended by traditional practitioners in the rural areas of Bangladesh. Most of the women do not have access to trained personnel during antenatal or delivery care. It is revealed in a recent study that 71.4% of the live births did not receive any antenatal care at all in Bangladesh (Mitra, Al-Sabir et al. 1997). The deliveries had taken place at home almost universally (95%). Only 16% of the deliveries were assisted by trained personnel such as doctor, nurse/midwife and trained TBA (traditional birth attendant), but 57% of the deliveries were assisted by untrained TBAs and 26% of the deliveries were assisted either by relatives or others. These facts reveal that the maternity care in Bangladesh is still far from an acceptable standard. Bhatia and Cleland (1995) presented an analysis of self-reported symptoms of genealogical problems among recent mothers in South India. They observed that approximately one-third of the women reported at least one current symptom and the most frequently reported current symptoms were anemia, menstrual disorders, vaginal discharge, lower abdominal pain and discharge with fever. A hospital-based study on maternal morbidity among women admitted for delivery at a public hospital in Kathmandu found that 94% of the respondents suffered from some problem or illness either during pregnancy or during labour and delivery (Smith, Lakhey et al. 1996). It is noteworthy that maternal health is greatly affected by a lack of adequate nutritional intake. Mcdonagh (1996) suggested the necessity of identifying procedures that could be included in the antenatal process. Kulier et al. (1998) showed that nutritional intervention during pregnancy with calcium supplementation could reduce the risk of high blood pressure and preeclampsia. Bhatt showed that at least 50% of the Indian women suffer from anemia during pregnancy. The pregnant women become anemic due to increased demand of iron during pregnancy,

preexisting negative iron balance attributable to frequent pregnancy, blood loss during menstruation and inadequate diet.

Patwardhan and Mukherjee (1995) indicated that pregnancy-induced hypertension may result in major causes of maternal morbidity and mortality as well as perinatal morbidity and mortality. Patwardhan observed that eclampsia is typically preceded by pregnancy-induced hypertension for many days, and even weeks. In a special issue on Safe Motherhood of the *Journal of Indian Medical Association*, Rao (1995) reported that women should be advised to avoid pregnancy too early, too late, too frequently and too close, and that female education needs to be emphasized. According to Choolani and Ratnam (1995), female literacy can play the most vital role in order to reduce maternal mortality. Education empowers women to take better care of themselves, with improvement in economic power and better social and legal status.

In this paper, an attempt is made to identify the factors associated with modes of delivery and delivery assistance. Findings from this study can lead to policy implications necessary to provide important guidelines to improve the situation concerning risks of delivery in rural areas of Bangladesh.

Data and Methods

This study employs data from the survey on Maternal Morbidity in Bangladesh conducted by the Bangladesh Institute for Research for Promotion of Essential and Reproductive Health Technologies (BIRPERHT) during November 1992 to December 1993. This study is based on the prospective component of the survey. A multistage sampling design included districts, thanas and unions were considered as the stages. Districts were selected randomly in the first stage, one district from each division. Then thanas (a thana is comprised of several unions, comprising of a population of size 0.2 million to 0.25 millions) were selected randomly in the second stage, one thana from each of the selected districts. At the third stage, two unions (unions are comprised of several wards which are small geographical boundaries comprising of villages in rural areas) were selected randomly from each selected thana. The subjects comprised of pregnant women with less than six months duration in the selected unions. All the selected pregnant women from the selected unions were followed on regular basis (roughly at an interval of one month) throughout the pregnancy. Again the subjects were followed at the time of delivery for a full-term pregnancy and 90 days after delivery or 90 days after any other pregnancy outcome. A total of 1,020 pregnant women were interviewed in the followup component of the study. The survey collected information on socioeconomic and demographic characteristics, pregnancy-related care and practice, morbidity during the period of followup as well as in the past, information concerning complications at the time of delivery and during the postpartum period. For the purpose of this study, we have selected 965 pregnant women, with at least one antenatal followup and information on delivery.

This study makes an attempt to address two important and related issues concerning delivery: (1) mode of delivery (normal or assisted), and (2) delivery assistance from trained or untrained personnel. These are the outcome variables of interest in the present study. The explanatory variables are: duration of pregnancy at the time of delivery, number of pregnancies prior to the index pregnancy (0, 1-4, 5+), level of education (no schooling, primary, secondary or higher), economic status (low, high), age at marriage (15 years or lower, more than 15 years), involved with gainful employment (no, yes), index pregnancy was wanted or not (no, yes), history of haemorrhage during antenatal period (no, yes), history of anemia (no, yes), history of fit and convulsion (no, yes), history of abdominal pain during antenatal period (no, yes), history of edema during antenatal period (no, yes), history of excessive vomiting during antenatal period (no, yes), and taken special food during pregnancy (no, yes). Two logistic regression models are fitted for analyzing modes of delivery and delivery assistance.

Results

Differential Patterns of Factors Associated with Delivery

In this section, differential patterns of the factors associated with delivery are presented. Two outcome variables – namely, mode of delivery and delivery assistance from trained or untrained personnel – are analyzed here for selected explanatory variables.

Mode of Delivery

The respondents were asked about the mode of delivery. The reported categories of mode of delivery were (1) normal delivery; (2) trial labor; (3) breech; (4) forcep-assisted delivery; (5) C-section; and (6) destructive procedure. Due to the small number of cases in our analysis, we regrouped (2)–(6) as complicated delivery. In other words, trial labour, breech and assisted deliveries, C-section and destructive procedures are considered as delivery complications. The differential patterns of delivery complications for selected variables are presented in Table 1.

Table 1. Differential of Modes of Delivery and Delivery Assistance by Selected Characteristics

Characteristics	Modes of Delivery (%)		Delivery Assistance (%)		N
	Normal	Assisted	Trained	Untrained	
Education			•		
No Education	90.8	9.2	11.8	88.2	532
Primary	93.8	6.2	11.0	89.0	272
Secondary or Higher	90.7	9.3	19.9	80.1	161
Economic Status					
Low	91.8	8.2	12.2	87.8	773
High	90.6	9.4	16.1	83.9	192
Gainful Employment					
Yes	93.5	6.5	14.4	85.6	306
No	90.7	9.3	12.3	87.7	659
Age at Marriage			**		
≤15 years	91.5	8.5	10.8	89.2	627
> 16 years	91.7	8.3	16.9	83.1	338
Pregnancy Wanted					
Yes	91.5	8.5	13.2	86.8	667
No	91.9	8.1	12.4	87.6	298
Number of Pregnancies Prior to the Index Pregnancy	••		••		
0	86.6	13.4	17.6	82.7	261
1-4	94.7	5.3	10.3	89.7	551
5 or more	88.9	11.1	14.4	85.6	153

Taken Special Food During Pregnancy			••		
Yes	92.4	7.6	18.9	81.1	238
No	91.3	8.7	11.0	89.0	727
Antenatal Visits	••		••		
No	94.6	5.4	10.8	89.2	555
Irregular Visits	89.1	10.9	10.9	89.1	119
Regular Visits	86.8	13.2	17.8	82.2	287
Past History of Anemia			•		
Yes	91.2	8.6	14.8	85.2	594
No	92.2	7.8	10.0	90.0	371
Complications During Pregnancy					
Hemorrhage	••				
Yes	79.8	20.2	8.4	91.6	119
No	93.2	6.8	13.5	86.5	842
Lower Abdominal Pain					
Yes	91.4	8.6	12.8	87.2	845
No	93.1	6.9	13.8	86.2	116
Odema					
Yes	90.1	9.9	10.4	89.6	212
No	92.0	8.0	13.6	86.4	749
Excessive Vomiting	•				
Yes	88.6	11.4	12.1	87.9	272
No	92.7	7.3	13.2	86.8	689
Fits/Convulsion	••				
Yes	86.0	14.0	10.5	89.5	171
No	92.8	7.2	13.4	86.6	790

** Significant at 1 % level; * Significant at 5 % level

The extent of delivery complications is observed to be higher (9.2% to 9.3%) among the respondents with no schooling or with highest level of schooling (secondary or higher level of education). However, the higher proportion of delivery complications to the respondents with no schooling and among the respondents with highest level of schooling might be attributable to the opposite nature of underlying reasons. The respondents with no schooling experience suffering from delivery complications during delivery due to lack of awareness and knowledge about maternity-related health care. While the respondents with highest level of schooling are expected to have better awareness and knowledge, due to their lifestyle they want to avail more assistance during delivery, resulting

in different complications. It is a common practice in the developing countries in particular that the assisted deliveries are positively associated with level of schooling.

The high-risk group is comprised of the first pregnancy and prior pregnancies of order five or higher. This is reflected in the findings of this study. We observe that 13% of the first pregnancies and 11% of the fifth or higher prior pregnancies are reportedly trial labour or assisted deliveries. The proportion of complicated deliveries is much lower (5%) among the respondents having had 1–4 pregnancies prior to the index pregnancy.

It is noteworthy that there is a positive statistically significant association ($p<0.001$) between antenatal visits during antenatal period and complicated delivery. This is indicative of the fact that the pregnancies with some prior symptoms of complications visit for antenatal care more often than those without having such symptoms.

All the selected complications during the pregnancy period appear to have increased the risk of complicated delivery, although all the associations are not statistically significant. However, haemorrhage during antenatal period increases the risk of complicated delivery almost three times, 20% among those who experienced bleeding during antenatal period as compared to 7% among those who did not experience haemorrhage ($p<0.001$). Fits/convulsion during pregnancy doubled the risk of complicated delivery ($p<0.01$). Excessive vomiting during pregnancy may also cause increased risk of complicated delivery ($p<0.05$).

Delivery Assistance

Trained personnel assist only very small proportions of pregnancies (13%) at the time of delivery, although this is an important issue for ensuring safe motherhood. The differential patterns by selected characteristics reveal that there exist large variations by different characteristics of the pregnant women (Table 1).

We observe that there is significant positive association between delivery assistance by trained health personnel and level of education ($p<0.02$). There is no much difference between pregnancies among the subjects with primary or no schooling in using services of trained personnel (11% to 12%), but a substantially higher proportion of subjects with secondary or higher level of schooling appear to be assisted by trained personnel at the time of delivery (20%).

Both for first (18%) and fifth or higher pregnancies (14%), the respondents appear to seek help from trained personnel more frequently as compared to that of respondents with 1–4 previous pregnancies (10%). The association between number of previous pregnancies and seeking delivery assistance from trained personnel is statistically significant ($p<0.02$).

Those who reported their age at first marriage 15 years or lower take delivery assistance from trained personnel (11%) at a significantly ($p<0.01$) lower proportion than those who reported their age at first marriage 16 years or higher (17%). It is expected that the respondents from higher economic status can afford to have assistance from trained personnel more than respondents from a lower economic status. This is reflected in the results, but the difference is not statistically significant. Similar results are obtained for gainful employment and whether the index pregnancy was desired or not.

The respondents who had taken special food during pregnancy appeared to have sought delivery assistance from trained personnel at a greater proportion (19% among those who had taken special food as compared to 11% of those who did not take any special food) ($p<0.01$). It is observed that regular antenatal visits can increase the delivery assistance from the trained personnel ($p<0.02$). Previous history of anemia increases the likelihood of seeking help from trained personnel.

Table 2 presents the association between delivery assistance and mode of delivery. The association is significant ($p<0.001$). It is evident that 18% of the deliveries assisted by trained personnel as compared to that of 7% of the deliveries assisted by untrained personnel were complicated deliveries (assisted or destructive). It indicates that still a substantial proportion of complicated deliveries are assisted by untrained personnel that might cause serious health hazards to the mothers during and after delivery.

Table 2. Percent Distribution of Respondents by Delivery Assistance and Modes of Delivery

Delivery Assistance	Modes of Delivery		N
	Normal	Complicated	
Untrained	93.1	6.9	840
Trained	81.6	18.4	125
N	884	81	965

Chi-square = 18.70 (p-value = 0.000)

Multivariate Analysis

Model 1 takes into account the mode of delivery as the outcome variable (Table 3). Two categories of modes of delivery are considered: (i) normal (0), if head presentation is observed, and (ii) complication of delivery (1), if C-section, forceps-assisted delivery, destructive procedures, breech presentation or trial labour are observed. The multivariate logistic regression model is fitted to the outcome variable, modes of delivery. Selected socioeconomic, demographic and past medical history of the respondents is taken into account in the model.

Duration of pregnancy at the time of delivery seems to have negative association with complications of delivery, although it was not significant. In other words, if the mother completes the full-term of pregnancy, there then is a lesser likelihood of complications at the time of delivery. However, there are increased risks of complications of delivery for the respondents either having their first pregnancy or having had five or more pregnancies before the index pregnancy under consideration. The risk of complicated delivery appears to be about 3.3 times higher ($p<0.01$) for the first pregnancy and about 2.6 times higher ($p<0.01$) for the fifth or more prior pregnancies, as compared to that of 1–4 prior pregnancies. Respondents having had a history of haemorrhage during the antenatal period appear to have increased risk (3 times) of complicated delivery ($p<0.001$). Women who visit regularly for antenatal care had higher risk of having complicated delivery, which might be attributed to the fact that the pregnancies with prior symptoms of complications during pregnancy visited for antenatal care at a higher proportion.

Model 2 addresses the issue of utilization of trained delivery cares assistance (Table 3). If trained health personnel are reported to have assisted the delivery, the outcome variable takes value 1, and if untrained persons assisted the delivery then the outcome variable is observed to be 0. It is interesting to note that the high-risk pregnancies (first pregnancy and five or more pregnancies before the current pregnancy) are likely to be assisted by trained personnel at a higher proportion ($p<0.05$). As compared to the respondents having no schooling, respondents having a secondary or higher level of education appear to have more frequent access (1.6 times) to trained delivery assistance ($p<0.10$). The respondents who reported their age at first marriage as more than 15 years receive assistance from trained personnel at a higher proportion (1.5 times) as compared to those who get married at an earlier age ($p<0.10$). Past history of anemia ($p<0.01$) increases the likelihood of seeking delivery assistance (1.8 times) from trained personnel. If visits are made on regular basis during the antenatal period, then the respondents are more likely (1.9 times) to seek assistance from trained health personnel.

Conclusion

This paper makes an attempt to focus on the important concerns associated with delivery. Two related outcome variables are analyzed in this paper: (1) mode of delivery, and (2) delivery assistance. It is demonstrated in this study that trained health personnel assist complicated deliveries at a much higher proportion than that of untrained personnel. However, still a substantial proportion (7%) of the deliveries assisted by the untrained personnel are seen to be complicated in a manner that might have caused serious health hazards.

It is observed that the mode of delivery is complicated (assisted or destructive) if the pregnancy is either first or fifth or higher order, and if there was bleeding during antenatal period. It is noteworthy that the respondents who visited for antenatal care have increased risk of complicated delivery.

Table 3. Estimates of the Parameters of Logistics Regression Model for Modes of Delivery and Delivery Assistance

Characteristics	Modes of Delivery (Model 1)			Delivery Assistance (Model 2)		
	Estimates	O.R.	95 % C. I	Estimates	O.R.	95 % C. I
Constant	-1.662	0.190		-3.688***	0.025	
Education						
Primary	-0.351	0.704	0.385-1.288	-0.033	0.968	0.599-1.563
Secondary or Higher	-0.088	0.916	0.457-1.838	0.468*	1.597	1.016-2.511#
(Reference: No Education)						
Economic Status (High=1)	-0.172	0.842	0.456-1.554	0.157	1.170	0.713-1.920
Gainful Employment (Yes=1)	-0.288	0.749	0.427-1.315	0.327	1.387	0.905-2.126
Age at Marriage (>15 Years=1)	0.108	1.114	0.654-1.897	0.387*	1.472	1.044-2.077#
Pregnancy Wanted (Yes=1)	0.095	1.100	0.604-2.002	0.033	1.033	0.638-1.672
Number of Pregnancies Prior to the Index Pregnancy						
0	1.179***	3.251	1.800-5.873	0.597***	1.817	1.136-2.905
5 or more	0.942***	2.564	1.253-5.250	0.669**	1.952	1.065-3.575
(Reference: 1-4 Pregnancies)						
Antenatal Visits						
Irregular Visits	0.397	1.487	0.702-3.149	0.206	1.229	0.629-2.402
Regular Visits	0.631**	1.880	1.068-3.310	0.661***	1.937	1.249-3.003
(Reference: No Visits)						
Duration of Pregnancy (months)	-0.250	0.779	0.568-1.068	0.093	1.097	0.839-1.434
Past History Anemia (Yes=1)	0.262	1.300	0.763-2.214	0.609***	1.839	1.172-2.883
Complications During Pregnancy						
Haemorrhage (Yes=1)	1.101***	3.008	1.651-5.478	-0.513	0.599	0.290-1.238
Lower Abdominal Pain (Yes=1)	0.119	1.126	0.499-2.543	-0.226	0.798	0.437-1.457
Odema (Yes=1)	-0.023	0.977	0.545-1.752	-0.159	0.853	0.506-1.438
Excessive Vomiting (Yes=1)	0.263	1.301	0.772-2.193	-0.092	0.912	0.579-1.438
Fits/Convulsion (Yes=1)	0.304	1.355	0.742-2.473	-0.276	0.759	0.425-1.355
Chi-square (p-value)	55.908 (0.000)			40.731 (0.001)		

*** Significant at 1 % level; ** Significant at 5 % level; * Significant at 10 % level
# 90 % C.I.

This might be attributed to the fact that in rural settings of Bangladesh the visit for antenatal care is generally made only if it is deemed necessary for the pregnancy, or in case of early symptoms of complication during antenatal period.

The high-risk group (first pregnancy and five or more prior pregnancies) respondents are likely to get assistance from trained personnel at higher proportions. Similarly, more educated respondents, as well as the respondents who reported to have gotten married at a relatively higher age, receive assistance from trained personnel at a significantly higher proportion. It is also noteworthy that the respondents having anemia have increased likelihood of receiving better delivery care.

Several policy options emerged from the findings of this paper. First, it is clearly evident that the high-risk groups, first or fifth or higher pregnancies, need special care, and the existing health management system may be strengthened to create awareness among the potential mothers for seeking appropriate measures since the beginning of a pregnancy. Both awareness and service providing system for the high-risk groups need to be based on the hard realities of prevailing socio-economic conditions and cultural and religious beliefs. Secondly, the process of antenatal followup needs to be strengthened to identify the high-risk pregnancies as well as to identify the pregnancies with past history of anemia and other complications, and a realistic referral system needs to be developed. Thirdly, the campaign for increased age at marriage and increased age at first birth need to focus the health issues more extensively so that a consensus develops at the grassroots level concerning the basic needs for a newly wed girl to be in good health. Finally, education for women needs to be given high priority in order to bring about a lasting impact on the overall health condition of women.

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