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Do Various Sources Disseminating AIDS Information Make Significant Difference to Antenatal Care in Bangladesh?

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Abstract

Extracting 5,194 women from the 1999-2000 Bangladesh Demographic and Health Survey, this study assessed impact of various sources disseminating AIDS information on antenatal care (ANC) services. Multivariate adjusted logistic regression found that radio, television, newspapers/magazines, pamphlets/posters, health workers, and friends/relatives significantly associated with ANC services. Multiple sources showed even stronger association with the services. Therefore this study underscored the needs of disseminating AIDS information from multiple sources to improve the ANC services and to increase AIDS knowledge and prevention activities among pregnant women.

KEY WORDS: AIDS information, Radio, Television, Antenatal care, Bangladesh.

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INTRODUCTION

HIV/AIDS is one of the five well-established causes of death in the world (Piot et al, 2001; Quinn, 1996). Mass media such as radio, television, newspapers, magazines, and cinema (Elkamel, 1996) has been used primarily as the most effective methods for disseminating HIV/AIDS prevention messages worldwide (Myhre and Flora, 2000). These medias are fighting against HIV/AIDS pandemic (Wolffers, 1997) by raising awareness and knowledge, changing attitudes and behaviors (WHO/ROEM, 2001; Elkamel, 1996). Using nationally representative data of Bangladesh Demographic and Health Survey (BDHS) 1999-2000, our recent study showed that 46% and 65% married men and women of reproductive age did not even hear about AIDS respectively. Among the various sources only radio, television, and newspapers/magazines were the most effective media in disseminating the various knowledge to avoid AIDS among ever married and women. Unfortunately health workers, which are widely available in every community in Bangladesh, were found ineffective in this regard. That study also revealed that exposure to multiple sources (two or more) simultaneously were highly effective in disseminating HIV/AIDS knowledge as compared to only one source. Therefore the study underscored the necessities of disseminating culturally suitable AIDS prevention messages not only from one source but from multiple sources simultaneously to face the challenge effectively (Khan et al, 2004).

Present study attempted to examine the additional impacts of the same sources, engaged in disseminating AIDS information, on antenatal care (ANC) services in Bangladesh. ANC usually refers to pregnancy related care provided by a health provider either in a medical facility or at home (Matthews et al, 2001). Many studies have indicated the necessities of ANC services by explaining the numerous advantages of them which may include monitoring health of the mother and baby during pregnancy, anticipating difficulties at pregnancy and labor with early treatment to reduce the risks for mother and child, facilitating the better use of emergency obstetric care services, disseminating health education and information, and so on (WHO/UNICEF, 2003; Carroli et al, 2001; NIPORT et al, 2001; Vanneste et al, 2000; Lindermark et al, 1998). These facilities imply that antenatal visits may confer benefits to both mother and baby, not only because women with serious conditions such as hypertensive diseases in pregnancy can be diagnosed and kept under observation, but also because a dialogue can be initiated which may facilitate the use of skilled care when the need arises (Vanneste et al, 2000). It also provides an excellent opportunity to disseminate health messages to both women and their families, not only for preparation for childbirth and infant care, but also for promoting healthy lifestyles, spacing births, family planning, child health, nutrition, immunization, malaria, tuberculosis, sexually transmitted diseases, and HIV/AIDS (WHO/UNICEF, 2003; Carroli et al, 2001; NIPORT et al, 2001; Lindmark et al, 1998). Moreover, use of ANC services by younger women is a key entry point for HIV testing and preventing mother-to-child transmission of it (WHO/UNICEF, 2003).

Although in theory, ANC might reduce maternal morbidity and mortality directly through the detection and treatment of pregnancy-related or inter-current illness, or indirectly through the detection of women at increased risk of complications of delivery and ensuring that they deliver in a suitably equipped facility (Carroli et al, 2001), unfortunately many women in both developed and developing countries do not get adequate care or do not seek care at all (Nielsen et al, 2001).

Bangladesh, one of the most densely populated countries in the world, is not an exception in this regard. According to NIPORT et al (2001), (i) nearly two-third (63%) of mothers in Bangladesh did not receive ANC services from the skilled attendants (doctor, nurse, mid-wife, family welfare visitors), (ii) more than 90% of the delivery occurred at home, and (iii) most of the mothers are living in rural areas with high rate of illiteracy and poverty (NIPORT, 2001). These figures strongly indicate the necessities of further attention to ensure the better access to the ANC services in Bangladesh. Since the rate of ANC are still very low as compared to many countries of the world (Zlidar et al, 2003) and has slightly increased from 29% in 1996-97 to 33% in 1999-2000 (NIPORT, 2001), it may be important to explore the possible ways of improving the present situation of ANC services. This study was an attempt in this regard and mainly focused on the impact of various sources, disseminating AIDS information, on ANC services in Bangladesh. Hopefully the significant findings of the study will assist policymakers and program managers in the planning of appropriate strategies to improve AIDS prevention activities primarily as well as to increase the rate of ANC services secondarily.

METHODS

Data from the BDHS 1999-2000 was used in this study. This survey was conducted during November 1999 to March 2000 through a collaborative effort of three organizations namely National Institute of Population Research & Training (NIPORT), Mitra & Associates in Bangladesh, and ORC Macro in USA. For the detailed methodology of the survey design including questionnaires, please see the report of NIPORT et al (2001). Briefly, the survey employed a nationally representative, two-stage stratified sample that was selected from the master sample maintained by the Bangladesh Bureau of Statistics (BBS). The master sample consisted of 500 primary sampling units (PSUs) which were selected with probability proportional to size from the 1991 census frame. From the master sample of 500 PSUs, BDHS 1999-2000 selected 341 PSUs (99 in urban areas and 242 in rural areas) again with equal probability proportional to size.

The survey teams then selected a systematic sample of 10,268 households from the 341 PSUs, of which 9,854 (response rate: 99.3%) were interviewed successfully. At the next step, the teams identified 10,885 eligible ever married women aged 10-49 years from these households, of which 10,544 (response rate: 97%) women were interviewed successfully. Although a lot of information such as background characteristics (age, education, occupation, religion, and so on), reproductive history, antenatal and delivery care, breastfeeding and weaning practices, vaccinations and child health problem under age five, fertility preferences, use of contraceptive methods, knowledge of AIDS/STDs, and so on were collected by administering questionnaires, this study used only few of them.

Variables selected (including categories) as predictors

Age (10-29 years, 30-45 years), education (no, 1-5 years, 6-10 years, 11+ years), place of residence (rural, urban), region of residence (Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Sylhet), religion (Islam, others), number of living children (0-2 children, 3+ children), working status of women (not working, working), whether woman could go health facility alone (not allowed, can go alone, can go with someone), final say about own health care (herself, others), final say about purchasing of household daily needs (herself, others), whether not having a health facility nearby was a problem (yes, no), whether going to health centre was a problem (yes, no), whether getting money for treatment was a problem (yes, no), whether husband was concerned for complications during pregnancy (yes, no),

whether ever heard sexually transmitted diseases (STD), and whether ever heard the term AIDS from any source like radio, television, newspapers/magazines, pamphlets/posters, health workers, friends/relatives, work places, billboards, and others (schools/ teachers, mosques/church/temples, community meetings and so on) were selected as predictor variables into this study. All the variables, except the sources of disseminating AIDS information, were adjusted under logistic regression analyses because they were found significantly associated with ANC services by previous studies (see discussion).

The unit of analysis in this study was those women who gave last birth within the 5 years prior to the survey i.e. after 1994. In case of women who gave multiple births during this period, only last birth was considered. Women who met the above criteria and hence analyzed comprised a subset of 5,194 women (49.3% of the total). A subtotal of 5,350 women who did not give birth after 1994 was excluded from this study.

Dependent variables

Following three variables were selected as ANC indicators (dependent variables) from the data set for analysis. For detailed information about these variables, please see Table 1.

- Whether they had any antenatal check up/visit (no=0, yes=1) during the period of last pregnancy. This variable was based on the question "did you see anyone for a medical check up/antenatal care during your pregnancy?" According to data, the number of women who received at least one antenatal check up was 2081 (40.1%), whereas 3096 (59.6%) women did not receive any check up. The missing cases were 17 (0.3%).

- Whether number of antenatal visits were adequate or not (≤3 times = inadequate, coded as 0; ≥4 times = adequate, coded as 1). This variable was related to the question "how many times did you receive medical check up during your pregnancy?" The nonnumeric answer 'do not know' (6 women only) was considered as missing cases during analysis. The number of women were 4,508 (86.8%), 669 (12.9) and 17 (0.3%) under inadequate, adequate and missing categories respectively.

- Whether number of antenatal services received during antenatal visits was adequate or not (≤3 services= inadequate, coded as 0; ≥ 4 services=adequate, coded as 1). The variable was based on 8 services offered to women at least once during any of the antenatal visits. These services were whether anyone: (i-iii) measured height, weight, and blood pressure, (iv-v) tested urine, and blood, (vi) examined eye/anemia, (vii) told about signs of pregnancy complications, and (viii) gave iron tablet or syrup for her or not (see Table 1). Although the answers of the above-mentioned services were recorded as either 'yes', 'no', or 'do not know' during the survey, for the analytical purpose the answer 'do not know' (varied from 1 to 9 women; about 0.1% of the total) was considered as missing cases. In total, the number of women under inadequate, adequate and missing categories were 3,638 (70%), 1,479 (28.5) and 77 (1.5%) respectively.

Since only the information whether woman visited anyone for antenatal check up was not sufficient to explore the situation of ANC services, we considered two more dependent variables

Table 1: Information about ANC services

Services	Number of women, n=5194	%
Number of ANC visits:		
0 (no visit)	3096	59.6
1	603	11.6
2	482	9.3
3	327	6.3
4	168	3.2
5	127	2.4
6	109	2.1
7	83	1.6
8	69	1.3
9	50	1.0
10	34	0.7
≥11	29	0.6
≥1 (received at least one antenatal visits)	2081	40.1
≤3 (inadequate number of visits)	4508	86.8
≥4 (adequate number of visits)	669	12.9
Missing	17	0.3
Name of services received (multiple answers)*:		
Weight measured	1541	29.7
Height measured	918	17.7
BP measured	1999	38.5
Urine tested	1127	21.7
Blood tested	914	17.6
Eye examined	1634	31.5
Signs of complications told	889	17.1
Iron tabled given	1949	37.5
Number of services received:		
0	2403	46.3
1	594	11.4
2	306	5.9
3	335	6.4
4	333	6.4
5	330	6.4
6	324	6.2
7	297	5.7
8	195	3.8
≤3 (received inadequate number of services)	3638	70.0
≥4 (received adequate number of services)	1479	28.5
Missing	77	1.5

*: missing cases were from 5 to 29 where answer 'do not know' ranged 1-9 included.

(indicators) based on (i) the number of antenatal visits, and (ii) number of services received during antenatal visits for better understanding. The justification of choosing the second indicator based on the number of antenatal visits was that a woman who visited ANC facilities only one time and who visited several times were not same in reality. Similarly, what types of services the women received from ANC facilities was not understandable by the number of antenatal visits only, so a third variable was selected. This study performed univariate, bivariate as well as multivariate analysis using Statistical Package for Social Science (SPSS). Chi-square (χ^2) test was used to test the bivariate relations under bivariate analysis. The strength of association was measured by odds ratio with

corresponding 95% confidence interval (CI) under multivariate logistic regression analysis. *P* values less than 0.05 were reported by asterisks to show the significance level.

RESULTS

Table 2 presented the number of women by different categories of the selected variables as well as the percentages of women for three study indicators whether they (i) received antenatal check up at least once during last pregnancy, (ii) received adequate number of antenatal check ups, and (iii) received adequate number of antenatal services. Although two-fifths (40%) of the women received antenatal check up, according to the present study only 13% received adequate number of check up and 29% received adequate number of services during check up. All the indicators were highest for younger age group (10-29 years) as compared to higher age group (30-49 years). Education was positively associated with all the indicators whereas number of living children was negatively associated. Problem in getting money was associated with lower rates of ANC measured by indicators. Women who could visit health facility alone had higher rates of ANC as compared to others. Almost all the selected variables were significantly associated with antenatal care indicators except working status of women, and final say about own health care.

Table 3 revealed some relevant information of ANC for the women. Among different sources who carried out antenatal check ups, qualified doctors were the main source of ANC providers (27.1%), followed by family welfare visitors (8.1%), nurse/midwifes (3.1%), and unqualified doctors (2.3%) respectively. About 14% women who received antenatal check up went for the first time during 1-3 months, followed by 16.5% in 4-6 months, and 10.0% in 6-10 months respectively. More than 80% of the women received tetanus toxoid injection during pregnancy. About 90% of the women delivered at home, followed by 7.1% in any government health facility, and 4.2% in private hospital/clinic respectively. The women who (60%) did not seek anyone for ANC mentioned several reasons. Out of them, more than 60% said that it was not beneficial for them. They did not know the necessity of such services comprised about 19%. Service was expensive was mentioned by 16.6% women. Other reasons were mentioned less frequently (up to 4.6%).

Table 4 mainly showed the results of logistic regression (OR with 95% CI) analysis for the ANC indicators by individual as well as multiple sources disseminating AIDS information. All the covariates mentioned in Table 2 were adjusted during logistic regression analysis. By individual sources, radio, television, newspapers/magazines, health workers, and friends/relatives were significantly associated with all the three ANC indicators. Pamphlets/posters were also significantly associated with two ANC indicators except antenatal check up for at least once though the direction remained same. By multiple numbers of sources, ORs for all indicators were significantly higher for all groups of women who had heard about AIDS as compared to women who did not heard about AIDS. Higher ORs was found as the number of sources increased. For instance, OR of receiving antenatal check up for at least once were 2.0 (95% CI: 1.7-2.4), 2.5 (95% CI: 2.0-3.2), 3.1 (95% CI: 2.2-4.6) and 10.3 (95% CI: 3.6-29.5) respectively when women heard about AIDS from 1, 2, 3 and 4+ sources compared with women who did not ever hear about AIDS. However, majority of the women (68.8%) did not ever hear about AIDS. Only 15.3%, 9.6%, 4.8% and 1.5% had heard about AIDS from 1, 2, 3 and 4+ sources respectively.

DISCUSSION AND CONCLUSION

Our study clearly demonstrated significantly positive association of ANC indicators with AIDS information received from the individual source like radio, television, newspapers/magazines, health workers, and friends/relatives as well as from the multiple sources. According to our knowledge, perhaps this was the first study in Bangladesh which attempted to assess such types of association. As similar studies are not still available in Bangladesh and possibly elsewhere, it was not possible to check the consistency of our results right now, but at least we could reasonably rely on them because this study was based on a nationally representative data of BDHS, which is generally considered as the main source of information for ANC services, and which obtained data on regional level and urban-rural comparisons. This study may also lead further researches in the same area mainly to test the hypothesis regarding the association of ANC services with AIDS information received from various sources by women.

Maternal mortality is undoubtedly an important public health problem in many developing countries (Carroli et al, 2001). It may be particularly true for Bangladesh, which was one of the 10 countries in the world with highest estimated number of maternal deaths. Approximately 20,000 maternal deaths occurred in 1995, with a maternal mortality ratio of 600 per 100,000 live births (Hill et al, 1995). Although information about pregnancy related complications are scarce in Bangladesh, however, one study reported that about one-quarter of the women were diagnosed with an obstetric complication such as hemorrhage, hypertensive disorders, and dystocia in Bangladesh (Vanneste et al, 2000). It was also reported that women who did not receive adequate ANC services had significantly higher rates of ante-partum, intra-partum, and post-partum fetal deaths (Twizer et al, 2001). Although many advantages of ANC services were already reported by other studies (WHO/UNICEF, 2003; Carroli et al, 2001; NIPORT et al, 2001; Vanneste et al, 2000; Lindmark et al, 1998), unfortunately present study revealed that three-fourths of the pregnant women did not receive any ANC from any of the sources. This figure is obviously very high as compared to other many countries in the world. According to the report of Zlidar et al (2003), who compiled the rate of women who received ANC services from the skilled personnel for 60 countries including Bangladesh, only few countries such as Ethiopia (20% in 2000), Niger (39% in 1998), Morocco (32% in 1992), Yemen (34% in 1997), and Pakistan (26% in 1990-91) were comparable to Bangladesh.

To improve planning and provision of ANC services in a specific setting it is important to characterize the women who do not get adequate care (Nielsen et al, 2001). Fortunately the study identified the problems/reasons of not seeking ANC services. The primary reason for not seeking ANC services was to believe that it was unnecessary. They did not know about services, and services were expensive were the second and third reasons for not seeking the ANC services respectively. Similar findings were reported by Erbaydar (2003). Perhaps the first two problems could be lowered by counseling the pregnant women with proper health education from the available health facilities including mass media like radio and television.

According to our data, more than 85% women delivered their last babies at home and only 7% delivered at government facilities in Bangladesh. Since home deliveries are always at increased risk of complications (van den Heuvel, 1999), this area obviously needs special attention in Bangladesh. One possible way to improve this situation may be the motivation of women to receive the delivery and

other ANC services from skilled health personnel like doctor, nurse and trained mid-wives. Because Vanneste et al (2000) reported that women in Bangladesh who were visited by the midwife during pregnancy were four times more likely to call the midwife around the time of labor and delivery than women who were not visited. As establishing a relationship with the midwife during pregnancy may promote the utilization of midwives during labor, and possibly facilitate entry into a hospital when needed, ensuring an interaction between the community and the medical system may therefore be the primary purpose of an outreach ANC program (Vanneste et al, 2000). Another way to improve the delivery situation may be to improve the quality of services including environment of the delivery places like health centers and hospitals. One study in Zimbabwe reported that maternity waiting shelters which is developed for women to stay sometime before and after the delivery were too small and crowded. The toilets were not in a good condition including shortage of water and so on (van den Heuvel, 1999). Therefore these facilities should be equipped by basic equipments and other supplies including medicines to reduce the extent of home deliveries and to handle all the pregnant women and their deliveries more efficiently.

One important question may arise about the categories (adequate vs. inadequate) of two ANC indicators. Present study considered 4 and above antenatal visits as adequate, because few studies (Erbaydar, 2003; WHO/UNICEF, 2003; Matthews et al, 2001; Addai, 2000; Munjanja et al, 1996) advocated or used such categories. For example, Matthews et al (2001) reported that four visits can produce maternal and child health outcomes that are just as favorable as more frequent antenatal contact regimes. Munjanja et al (1996) did not find any significant difference in the outcomes associated with pregnancy and delivery between 4 and 6 antenatal visits. On contrary, fewer than 4 antenatal visits were independently significantly associated with antepartum fetal deaths also (Huang et al, 2000). Perhaps for such evidences WHO/UNICEF (2003) recommended four antenatal visits according to gestational age during pregnancy. However, at least 5 visits in Zimbabwe and India (van den Heuvel et al, 1999; Nielsen et al, 2001), or even more (Alexander and Kotelchuck, 1996) elsewhere was defined as adequate use of ANC services.

This study might have some advantages. Firstly, the logistic regression model was adjusted for many variables (Table 4), of which many of them were found associated with ANC services by other studies (WHO/UNICEF, 2003; Bloom et al, 2001; Cindoglu and Sirkeci, 2001; Addai, 2000; Celik, 2000; Gazmararian et al, 1999; van den Heuvel et al, 1999). The identified variables which maintained association with ANC services by one or more of these studies were: age, education, religion, number of children/birth order/parity/number of pregnancies/fewer deliveries, urban-rural place of residence, region, socio-economic status/income, occupation/working status/unemployment, little help from husband, freedom of movement as well as women's autonomy on the use of health care, distance of health facility, availability of sub-health centre in the village/locality, and so on. However, the above-mentioned factors that determine the use ANC care services are, in general, inconsistent from studies to studies. Variations in study methodology (such as study design and used definitions), analysis (univariate and multivariate), study areas, and cultures may probably explain some parts of contradicting conclusions (van den Heuvel et al, 1999). Secondly, this study used nationally representative data based on well designed methodology (NIPORT, 2001). The results of the study were also comparable to the results of other countries since similar surveys were also conducted in other countries under worldwide Demographic and Health Survey program. Thirdly, only those women were selected for analysis who gave birth within 5 years prior to the date of survey. As the

Table 2: Antenatal care of women by selected variables

Variables:	No. of women	Received antenatal check up (No=0, yes=1)	Received sufficient antenatal check up (≤3 times=inadequate, ≥4 times=adequate)	Received sufficient services (out of 8) (≤3 services=inadequate, ≥4 times=adequate)
	n	%	%	%
Overall:	5194	40.2	12.9	28.9
Age group:				
10-29 years/30-49 years	3806/1388	43.1/32.3***	13.9/10.1***	31.1/22.8***
Education in years:				
No education	2263	24.6***	3.4***	15.6***
1-5 years	1510	37.6	7.6	24.5
6-10 years	1161	61.5	24.9	46.9
11+ years	260	95.8	73.8	89.9
Place of residence:				
Rural/urban	3808/1386	31.8/63.3***	6.4/30.9***	21.6/49.2***
Region of residence:				
Barisal	473	40.7***	12.3***	27.5***
Chittagong	1058	35.5	10.4	24.9
Dhaka	1254	38.7	14.1	28.4
Khulna	815	51.1	18.4	37.3
Rajshahi	973	42.3	12.6	31.6
Sylhet	621	33.3	8.4	22.5
Religion:				
Islam/others	4576/618	39.7/44.0*	12.6/15.4*	28.2/34.2**
Number of living children:				
0-2 children/3+ children	3082/2112	47.5/29.6***	16.7/7.42***	35.0/20.0***
Working status:				
Not working/working	4274/919	40.7/38.1	12.9/13.1	29.2/27.7
Can go health facility alone:				
Not allowed	974	24.3***	5.2***	14.9***
Yes alone	1203	52.6	22.1	41.6
Yes with someone lese	3013	40.4	11.7	28.4
Final say about own health care:				
Herself/others	907/4285	41.0/40.1	16.9/12.1***	30.9/28.5
Final say about purchasing of daily needs:				
Herself/others	857/4331	47.8/38.9***	19.3/11.7***	36.7/27.4***
Not having health facility is a problem: Yes/no				
Going to health facility is a problem: Yes/no	4494/676	38.6/51.5***	11.8/20.4***	27.3/40.1***
Getting money for treatment is a problem: Yes/no	2844/2328	32.7/49.5***	8.1/18.8***	21.7/37.8***
Husband is concerned for wife's problem during pregnancy: Yes/no+	4052/1119	34.4/61.2***	8.5/28.9***	23.3/49.2***
Ever heard STDs: Yes/no	4938/247	40.9/26.4***	13.4/3.3***	29.6/15.7***
	600/4593	58.8/37.7***	25.8/11.2***	48.1/26.4***

+do not know is included

*** P (2-sdided) <0.001, ** P<0.01, * P<0.05 by χ^2 test for testing association between two variables

Table 3: Information about antenatal care activities by women

	Number of women	%
Person carried out prenatal/antenatal check up (multiple answers):	n=5188	
No one	3096	59.68
Qualified doctor	1406	27.10
Family welfare visitor	419	8.08
Nurse/midwives	162	3.12
Unqualified doctor	121	2.33
Trained traditional birth attendant	13	0.25
Untrained TBA	9	0.17
Others	67	1.29
Months for pregnancy when women went for first antenatal check up:	n=5186	
No check up	3096	59.70
1-3 month	719	13.86
4-6 months	854	16.47
6 months and above	517	9.97
Received any Tetanus Toxoid (TT) injection during pregnancy:	n=5188	
Yes	4238	81.69
No	950	18.31
Place of delivery:	n=5188	
Own home	3327	64.13
Others home	1266	24.40
Government health facility (hospital, health centre, health post)	369	7.11
Private clinic/hospital	217	4.18
Others	9	0.17
Reasons for not seeking anyone for antenatal care (multiple answers):	n=3083	
Not beneficial/needed	1922	62.34
Did not know of need for service	569	18.46
Service to expensive	512	16.61
Was unable/not permitted to go out of the house	143	4.64
Did not know of existence	133	4.31
Too far	130	4.22
Religious reasons	67	2.17
Inconvenient service hour	26	0.84
Unpleasant staff behavior	19	0.62
Lack of privacy	10	0.32
Long waiting time	8	0.26
Inadequate drug supply	7	0.23
Lack of provider expertise	3	0.10
Others	99	3.21

Table 4: Percentage of women received antenatal care as well as multivariate adjusted[†] odds ratio including 95% confidence interval (CI) for various sources of AIDS information in Bangladesh.

	No. of women	Received antenatal check up (no=0, yes=1)		Received sufficient antenatal check up (≤4 times=not sufficient, ≥5 times=sufficient)		Received sufficient services (out of 8) (≤3 services=not sufficient, ≥4 services=sufficient)	
		%[a]	OR (95%CI)	%[b]	OR (95%CI)	%[c]	OR (95%CI)
Individual Sources of AIDS information:							
Radio:							
No	4662	36.5	1.0	10.3	1.0	25.3	1.0
Yes	529	72.5	1.7 (1.3-2.1)***	35.6	1.5 (1.2-1.9)***	59.7	1.6 (1.3-2.0)***
Television:							
No	4027	30.1	1.0	5.4	1.0	19.3	1.0
Yes	1164	74.8	2.5 (2.1-3.0)***	39.0	2.6 (2.0-3.3)***	61.9	2.5 (2.0-2.9)***
Newspapers/Magazines:							
No	4961	38.8	1.0	10.4	1.0	26.4	1.0
Yes	230	91.7	2.7 (1.6-4.5)***	68.0	2.2 (1.5-3.3)***	81.5	1.8 (1.2-2.7)***
Pamphlets/Posters:							
No	5117	39.6	1.0	12.3	1.0	28.2	1.0
Yes	74	80.8	1.6 (0.8-3.2)	54.8	1.9 (1.1-3.4)***	75.0	2.1 (1.1-4.0)***
Health workers:							
No	5050	39.3	1.0	12.3	1.0	27.8	1.0
Yes	141	70.5	2.3 (1.5-3.4)***	35.3	2.5 (1.6-3.9)***	65.5	3.1 (2.1-4.7)***
Friends/Relatives:							
No	4595	36.7	1.0	10.2	1.0	25.4	1.0
Yes	596	66.7	1.7 (1.4-2.2)***	33.5	1.9 (1.5-2.4)***	55.3	1.9 (1.5-2.3)***
Workplaces:							
No	5170	40.0	1.0	12.8	1.0	28.7	1.0
Yes	21	95.0	8.6 (1.0-70.5)*	45.0	1.1 (0.4-3.3)	76.2	2.0 (0.7-6.4)
Billboards:							
No	5167	40.1	1.0	12.8	1.0	28.8	1.0
Yes	24	62.5	1.5 (0.6-3.7)	33.3	2.8 (1.0-7.4)*	52.2	1.6 (0.7-4.0)
Others:[§]							
No	5097	39.8	1.0	12.6	1.0	28.6	1.0
Yes	94	59.6	1.3 (0.8-2.1)	27.7	1.3 (0.7-2.4)	45.7	1.2 (0.7-2.0)
Number of sources:							
0	3572	27.4	1.0	3.9	1.0	16.9	1.0
1	793	59.5	2.0 (1.7-2.4)***	21.6	2.5 (1.9-3.3)***	44.3	2.1 (1.7-2.5)***
2	497	72.0	2.5 (2.0-3.2)***	37.7	3.9 (2.9-5.3)***	58.2	2.6 (2.0-3.3)***
3	251	81.6	3.1 (2.2-4.6)***	48.8	3.9 (2.7-5.8)***	74.0	3.9 (2.8-5.6)***
4+	78	94.7	10.3 (3.6-29.5)***	65.8	7.1 (3.8-12.9)***	85.7	6.6 (3.2-13.3)***

[§] Mosque/church/temple, school/teachers, community meeting, and all others are combined.
[a] % received antenatal check up, [b] % received sufficient antenatal check up, [c] % received sufficient services.
*** P<0.001, ** P<0.01, * P<0.05
[†]Adjusted for age, education, place of residence, division (region of residence), religion, number of living children, working status, can go hospital/health centre alone, final say about own health care, final say about purchasing of household daily needs, whether not having health facility nearby is a problem, whether going to health facility is a problem, whether getting money for treatment is a problem, husband is concerned for wife's problem during pregnancy, and ever heard STD.

period was relatively short, the answers of the questions might be assumed as correct, i.e. less affected by recall bias or memory loss or imagination. However, the estimates of the survey and hence the results of the study may be affected by both non-sampling errors (results of mistake made in implementing data collection, data processing and so on) and sampling errors. The data was based solely on women's self report and we did not have the opportunity to validate the information given by women with independent from other sources. But it was reported that to minimize the errors, numerous efforts were made during the survey (NIPORT et al, 2001).

In brief, as (i) the available literatures have indicated numerous advantages of receiving ANC services, (ii) the information of AIDS received from the individual as well as multiple sources significantly increased AIDS prevention activities (Khan et al, 2004) and ANC services (by the present study), (iii) adequate number of ANC visits were very low (only 13%) in Bangladesh, and (iv) the rate of women did not even hear about AIDS was very high (about 70%), Bangladesh should disseminate AIDS information from all possible sources to increase both AIDS prevention activities as well as to improve the ANC services in Bangladesh. At least, Bangladesh could utilize the large number of health and family planning workers working at the community level all over the country more efficiently than other significant sources such as radio, television, newspapers/magazines, pamphlets/posters, mainly because of limited access and high illiteracy. Moreover, special attempts should be made mainly from health providers working at community level for encouraging the women to use ANC services. However, for overall improvement in ANC services in Bangladesh, at first we have to reduce/overcome the existing problems identified by women. Lastly, since we did not find any studies to compare our findings, for validating purpose further studies based on similar objectives using similar types of data are highly recommended in Bangladesh as well as other countries.

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