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Pitout JDD, Church DL, Gregson DB, Chow BL, McCracken M, Mulvey M, Laupland KB (2007). Molecular epidemiology of CTXM-producing *Escherichia coli* in the Calgary Health Region: emergence of CTX-M-15-producing isolates. *Antimicrob. Agents Chemother.* 51: 1281-1286.

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Full Length Research Paper

Trafficking and consumption of hard drugs in Côte d'Ivoire from 1999 to 2007

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Côte d'Ivoire, like other West African countries, is faced with the problem of drug trafficking and drug abuse in the last decade. During the period from 1991 to 1999, about 7,500 drug cases were handled by the Ivorian judiciary, with an average of 830 cases per year. This figure increases the magnitude of the problem in Côte d'Ivoire, considering the negative effect of drug addiction on the economy, and social aspects of the country, for example: unemployment, crimes, physical and moral violence, robbery, compromised health and well-being, etc. This phenomenon is very alarming as it concerns both the adolescents and adults of the population. In order to have a clear picture of the evolution of drug abuse in Côte d'Ivoire, a survey was conducted, with the assistance of the national police in the department of drug and narcotics law enforcement, that provide us with the data from the period of 1999 to 2007. During this period, 7737 people were charged to court for drug offenses under Ivorian law on drugs, of which 58.5% were Ivoirians, while 41.5% were foreigners. Women constituted 6.51% and minors were 2.1%, in the people included, all belonging to different varieties of social and professional circle. Moreover, drug seizures continued to increase steadily in an alarming rate with Indian hemp or *Cannabis sativa* (15.076.7 kg) leading, followed by cocaine (26.9 kg) and finally heroin (85.8 g). To examine the impact this problem has on education, a survey was conducted in high schools in different communities of Abidjan. Our survey revealed that in schools, 8 to 29% of students were involved in drug abuse. Smoking of Indian hemp is the most common and occurs between 17 and 20 years. The majority of these young consumers lives in the sub hub area of Abidjan and belonged to the middle class. It is therefore very important and urgent to strengthen the capacity of our law enforcement agents and the fight against drug trafficking in the country, and to develop awareness campaigns among youths in high schools and colleges to kick against drug abuse.

Key words: Hard drugs, addiction, smuggling, school survey.

INTRODUCTION

From time immemorial, man takes natural or chemical substances to get relieved from pain to boost his physical, intellectual or religious capacity or escape from daily realities and forget his worries. However, some drugs can lead to physical or psychological dependence, which often induce physical or mental disturbances. In 1975, the World Health Organization (WHO) defined

addiction as “a physical or psychic state resulting from the interaction between a living organism and chemical substances, characterized by showing an attitude of compulsory dependence on the substances, by taking it on a regular or periodical basis, to feel its immediate effect or to avoid the discomfort of its absence” (Valleur and Matysiak, 2006). Drug addiction therefore deprived

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one of his freedoms since an addict's life depends on the drug.

In general, data related to drug abuse showed that it can specifically induce the risk of acute intoxication, coma associated with overdose, the risk of infectious diseases, like human immunodeficiency virus (HIV) and hepatitis C, general complications like slimming with the impaired general health condition, psychiatric complications like depressive syndrome, complications such as social isolation, marginalization and judicial complications (Cavalcanti, 2011).

According to the United Nations Office for Drugs and Crime Control (UNODC, 2007), controlled drugs affect at least one out of 200 people in the world, at an age group between 15 and 65 years, killing thousands of people every year and throwing millions more into poverty. Also, in its 2004 report, UNODC (2004) mentioned that about 3% of the world's population that was estimated to about 185 million people has used hard drugs. A small proportion used cocaine (13 million) or opiates (15 million); cannabis were by far the largest, with more than 150 million people. In addition, UNODC counted 38 million amphetamine users and 8 million ecstasy users during the same period (UNODC, 2004).

In addition, the International Narcotics Control Board (INCB, 2008) states that 200 to 300 tons of cocaine is transported to Europe, via West Africa. The African continent has 7.6% of the world cocaine users, concentrated in Southern Africa and in the coastal region of North Africa. In addition, trafficking and abuse of heroin are steadily rising in several African countries.

In Côte d'Ivoire, drug consumption has become a major problem in the society. Abidjan with its large population of over 5 million people, good road network, rail, sea and air has facilitated the increasing drug consumption phenomenon in schools, among prostitutes and among homeless children. Also, socioeconomic and political crisis, which occurred in 2002 has aggravated the situation, increased armed robbery cases and assaults in the capital city, creating an atmosphere of insecurity.

The fight against illegal trafficking of drugs and psychotropic substances is a constant concern for the Ivorian authorities, who have established a specialized body, the National Drug Law Enforcement Agency since the early years of independence (1960), now replaced by the Police Directorate on Narcotics and Drugs, established by Decree 81-885 of 24 October 1981. The Inter-ministerial Committee for the Fight against Drugs (CILAD, 2007) reported that 11.7 kg of cocaine, 32.2 kg of heroin and 5.225 tons of cannabis were seized and 1,150 people, of whom 71% are Ivoirians, were arrested and detained.

According to the results of the study initiated by the laboratory of toxicology and food hygiene in 1991 and 2001, the rate of drug use in schools was between 1.94 and 16.75% in 1991 and 4.66 and 26% in 2001, respectively (El amine, 1993; Dano et al., 2003). In view of the social and political upheavals in recent years in the

country and the potential impact on the scourge of drug abuse in our society, our laboratory has undertaken a study in order to update the data originally recorded.

Two main objectives were assigned to our work. The first objective was to detect the evolution of drug trafficking in Côte D'Ivoire by analyzing data on seizures of narcotics and drugs for the period 1999 to 2007 and to compare it with that recorded during the between the period of 1991 and 1999. The second objective was to conduct a survey among the students to evaluate their drug consumption and notice any changes from previous surveys.

MATERIALS AND METHODS

This study was conducted in two stages as the following. The first stage, lasting for three months, involved the analysis of statistical data on drug seizures in Côte d'Ivoire provided by the Ivorian Police Force Department of Anti-drug and Narcotics. This is a retrospective study covering the period from 1999 to 2007. It focused on the following variables: the number of drug cases handled by the courts, people involved in trafficking (women arrested, minors arrested) the nationality of the accused person's as well as the nature and quantity of drugs seized.

The second stage of the study aimed to measure the prevalence of hard drug consumption among students. This survey was conducted from January to March, 2009 in schools within the ten municipalities of the city of Abidjan. These schools were selected based on their reputation and their size (number of students). The selected target population consisted of students of the years 3, 4, 5 and final year (aged 14 and above). The choice of the population was made on the basis of students' ability to make a decision. A study conducted by Manda et al. (2004) in the ten municipalities of Abidjan on drug addiction in schools gave a prevalence of 13.4%. To determine the sample size of the study, the following formula was used: $N = E.P.Q/l^2$ (N = sample size, P = Prevalence: 13.4%, $Q = 1$, $P = 1 - 0.13 = 0.87$, E = error threshold = 1.96 l = error risk = 5%). This study constituted 100 students per school thus 300 students in each municipality. This gave us a representative sample size of 3000 students. The questionnaire was self-administered anonymously. The main "items" covered in the questionnaire were: age, sex, and the municipality in which the school is located; social class of parents (students surveyed are most often from different social strata, F = favored class, high-income parents, M = medium class, middle-income parents, Lower class = low income parents), the type of drug used, the pattern of consumption, place of residence. After authorization from the administration of the various schools, the questionnaire was distributed and filled in classroom within 15 to 20 min.

Questionnaires were also given to certain groups of students in the school playground during recess. Then, data collected were processed using Excel software.

RESULTS

The situation of cases handled by the Ivorian justice relating to drug trafficking is recorded in Table 1. On the average, 641 drug cases that were treated by the courts each year during the period of 1999 to 2007. An average, 1003 people were arrested of which 859 cases faced court trial. Among those tried in court, 56 women and 25 minors were involved, a rate of 6.51 and 2.91%,

Table 1. Drug cases handled in Côte d'Ivoire from 1999 to 2007.

Case	Year									Total	Average \pm SD
	1999	2000	2001	2002	2003	2004	2005	2006	2007		
Cases handled	892	673	849	604	565	484	465	628	615	5775	641.66 \pm 9.95
Arrested	1157	885	1039	989	884	846	793	1102	1334	9029	1003.22 \pm 5.17
Accused	1134	885	990	881	645	577	648	872	1105	7737	859.66 \pm 5.82
Female accused	83	80	99	65	41	18	25	44	54	509	5655 \pm 3.43
Minor accused	43	92	99	46	26	13	8	12	18	231	25.66 \pm 6.96

Table 2. Nationality of accused person from 1999 to 2007.

Nationality	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average \pm SD
Ivoirians (%)	670 (59)	519 (58)	585 (59)	486 (55)	412 (57.6)	377 (65.3)	407 (62.8)	576 (66.3)	806 (72.9)	537.5 \pm 5.65
Foreigners (%)	564 (41)	366 (42)	405 (41)	395 (45)	233 (42.4)	200 (34.7)	241 (37.2)	292 (33.7)	299 (27.1)	380 \pm 5.97

Table 3. Annual statistics on seizures of drugs and narcotics from 1999 to 2007.

Drug		1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Héroïn (kg)		0.0018	0.0028	0.0103	0.034	0.0063	0.0042	0.0001	0.0021	0.0237	0.0858
Cocaïne (kg)		9.781	3.442	1.048	3.15	0	0.006	0.07	0.4489	9	26.9
Cannabis (kg)		751.2	1236.6	1876.6	3777.3	805	1848.7	1347.2	1821.7	1612	15076.7
Hashish (g)		0	0	0	0	0	0	0.1	0	0	0.1
Amphé-tamine	kg	9.219	0.2	0.124	0	0	0	0	0	0	9.543
	tb	0	0	910	0	2100	0	0	0	0	3010
Ephé-drine	kg	3.012	5.767	61.217	0	0	0	10	0	0	96.996
	tb	0	1462	13487	66373	52455	168813	146100	35465	20041	504196
Benzo-diaépine	kg	40.75	48.646	296.04	0	0	0	0	0	0	348.439
	tb	0	3901	0	247356	259794	128750	122604	170798	130584	1063787
Banned drugs	kg	7612.2	4792	9669.2	6013.4	4249.2	3323.2	5191	6821.2	12609	60280.92
	tb	0	17565	115558	0	0	0	0	0	0	133123

tb: Tablets.

respectively. These people were mostly of Ivorian nationality (58.5%) (Table 2). During the period of 1999 to 2007, several types of drugs and

narcotics were seized by the law enforcement agencies, and they are: heroin (0.0858 kg), cannabis (15,076.7 kg) ephedrine (96.996 kg),

cocaine (26.9 kg) benzodiazepines (348 kg), hashish (0.1 kg) and a large quantity of banned drugs (Table 3).

Table 4. Comparison table of drug seizures (*Manda et al., 2004).

Drug	Average from 1991-1999*	Average from 1999-2007	Evolution 1991-1999/1999-2007 (%)
Héroïn (kg/year)	0.00319	0.00953	+ 198
Cocaïne (kg/year)	10.39	2.99	- 71.22
Cannabis (kg/year)	1250.1	1675.1	+ 34
Ephédrine (kg/year)	6.668	10.77	+ 61.62
Barbiturique (tb/year)	8316	00	- 100
Benzodiazépine (kg/year)	17.88	38.66	+ 116
Crack (kg/year)	0.42	00	- 100
Opium (kg/year)	1.42	00	- 100
Hashish (kg/year)	0.013	0.00001	- 99.99
Banned drugs (kg/year)	80.20	6697.88	+ 8251

Table 5. Drugs taking in schools according to age and sex of students.

Community	user	Age (years)				Sex	
		14-17	18-20	21-23	24-26	Boy	Girl
						Number	Number
Attécoubé (Atté)	87	18	51	15	3	69	18
Port-Bouet (Por)	66	9	30	21	6	42	24
Abobo (Abo)	66	21	36	9	0	48	18
Yopougon (Yop)	63	39	12	9	3	39	24
Adjamé (Adj)	54	3	36	12	3	40	14
Koumassi (Kou)	45	9	33	3	0	24	21
Treichville (Trei)	40	12	9	15	4	25	15
Marcory (Mar)	33	9	21	3	0	30	3
Cocody (Coc)	30	5	8	15	2	24	6
Plateau (Pla)	24	6	18	0	0	18	6
Total (%)	508 (16.93)	131 (26%)	254 (50%)	102 (20%)	21 (4%)	359 (70.66%)	149 (29.34%)

respectively. These people were mostly of Ivorian nationality (58.5%) (Table 2). During the period of 1999 to 2007, several types of drugs and narcotics were seized by the law enforcement agencies, and they are: heroin (0.0858 kg), cannabis (15,076.7 kg) ephedrine (96.996 kg), cocaine (26.9 kg) benzodiazepines (348 kg), hashish (0.1 kg) and a large quantity of banned drugs (Table 3).

The drug addiction survey among students was conducted in all the ten districts of Abidjan, in 30 secondary schools with 3,000 students. The results are shown in Tables 4, 5, 6 and 7. Of the 3,000 students questioned, 508 have used banned drug at least once in their lifetime, a rate of 16.93%. Municipalities most affected by this scourge were: Attécoubé (87 students, 29%), Abobo-gare (66 students, 22%), Port-bouet (66 students, 22%) and Yopougon (63 students, 21%).

The rate of students who use drugs ranged from 8 to 29% depending on the municipality, which corresponds to an average of 51 students, or 17%. We noted a male predominance with a sex ratio of approximately 5:2 (70.66% boys and 29.34% girls). Half (50%) of consumers belonged

to the age group of 18 to 20 years (Table 5). 78.74% of the consumers lived in neighborhoods and belongs to the middle class (43.7% families. The reasons given for consuming drugs by students during our survey were multiple. The main reasons were peer pressure (44.06%), curiosity (44.1%) and family and school problems (9.84%) (Table 6).

DISCUSSION

Addiction is a public health problem for decades in many countries. In 1912, International Convention of the Hague stressed the importance of the international fight against drug abuse and trafficking of opium and other narcotics. In Côte D'Ivoire, an average of 641 cases of drug abusers was handled each year by the courts during the period of 1999 to 2007. An average of 1003 people were arrested including 859 cases charged to court. Among those charged to court, 56 women and 25 minors were involved, rates of 6.51 and 2.91%, respectively (Table 1).

Table 6. Drugs taking by students according to their residence, social class of parents and motive of consumption.

Parameter		Community										User	
		Yop	Pla	Coc	Adj	Kou	Abo	Mar	Por	Trei	Atté	Nb	%
Residence	P	60	12	10	51	42	63	12	57	21	72	400	78.74
	M	0	9	8	0	3	0	21	9	16	9	75	14.7
	L	3	3	12	3	0	3	0	0	3	6	33	6.5
Sociale Class	F	12	12	12	3	12	9	12	24	6	27	129	25.4
	M	39	6	15	3	30	39	21	21	15	33	222	43.7
	D	12	6	3	48	3	18	0	21	19	27	157	30.9
Motive of consumption	C	33	9	7	18	30	36	9	39	13	30	224	44.1
	F	24	12	20	30	12	24	18	21	25	48	234	46.06
	P	6	3	3	6	3	6	6	6	2	9	50	9.84

Community: Yop (Yopougon); Pla (Plateau); Coc (Cocody); Adj (Adjamé); Kou (Koumassi); Abo (Abobo); Mar (Marcory); Por (Portbouet); Trei (Treichville); Atté (Attécoubé). Motive of consumption: P (family and school problems); C (Curiosity); F (Companionship). Social class: F (rich); M (medium class); D (poor). Residence: P (popular area); M (medium); L (reserved area).

courts over the same period, with a decrease of 23.12%. However, these authors indicated the indictment of 131 women and 52 children, a decrease of 56.9 and 51.37%. Moreover, concerning the nationality of the persons charged to court, the present survey recorded that 537 Ivorian corresponds to 58.5% against 598 Ivorian cited by Dano et al. (2003), with a decrease of 10.2% (Table 2).

Data collected during our study has enabled us to identify the progress being made by our police in their fight against drug trafficking. significant decrease was observed in the number of people involved in this drug trafficking; however, there was more participation of female gender and minors. Traffickers appear to adopt new strategies to sell their products, depending on the seducing capacity of women and the naivety of youths.

Drug trafficking evolution

Abidjan, like most African capital cities has become a preferred transit for traffickers. Our survey shows that several types of drugs and narcotics were seized by the enforcement agencies, such as heroin, cannabis, ephedrine, cocaine, benzodiazepines, hashish and a large quantity of prohibited products (Table 3). Several years back, all these products have been the object of seizures as reported by studies conducted by EL Amine (1993) and Manda et al. (2003). However, a net decrease has been observed in the quantities of seized products, a net decrease compared to previous years. Also, some products such as opium, crack and barbiturates have not been reported seized for the period of 2001 to 2007.

Cannabis was the most widely consumed hard drugs in the clandestine market in Côte d'Ivoire. It is taken in the form of herbal cannabis, in the form of cigarettes leaves

or flowering tops. Resins and oils from cannabis were not used. Different names are given to it: "*Guedji, Ganja, Joint, Wausau.*" Official figures given by a law enforcement agency concerning seizure has been made, 751.2 kg in 1999 against 1612 kg in 2007 with a peak of 3777.3 kg in 2002 (Table 3), given an annual average of 1675.1 kg over the period of 1999 to 2007. Dano et al. (2003) had reported annual seizure of 1250.1 kg over the period of 1991 to 1999, an increase of 34%. Tigori-Sangare et al. (2011) in their study detected the psychoactive substances in the urine of users in the city of Abidjan, and showed that cannabis is the most consumed psychoactive substance, in fact that explains the vast trafficking of cannabis.

The presence of heroin in Côte d'Ivoire is directly related to a well organized international drug trafficking by some Africans who carry the drug from the place of production, the Southwest Asia (Pakistan, Afghanistan, India), to Europe and the United States via many African capital cities (Dano et al., 2003). The heroine is in the form of white or gray powder, 1.8 g were seized in 1999 against 23.7 g in 2007 with a peak of 34 g in 2002 (Table 3), an annual average of 9.53 g during the period of 1999 to 2007. The study, conducted over the period of 1991 to 1999 by Dano et al. (2003) reported an average of 3.19 g and increase of 198%. This figure indicates a significant increase in the trafficking.

Cocaine is in the form of white powder. 9.781 kg were seized in 1999 against 0.4484 kg in 2006, with a peak of 9.781 kg in 1999 (Table 3). The annual average over the period of 1999 to 2007 is 2.99 kg. These figures are in decline compared to those observed by Dano et al. (2003) who reported an average of 10.39 kg per year, a decrease of 71%.

Trafficking of benzodiazepine can be traced back to the 90s when the first seizures were made in Cote d'Ivoire,

Table 7. Drug consumption among students according to type of drug and social class of parents.

Type of drug	Community										Social class			User	
	Yop	Pla	Coc	Adj	Kou	Abo	Mar	Por	Trei	Atté	F	M	D	Nb	%
Héroïn	18	3	3	0	9	9	0	9	3	6	31	11	19	60	11.81
Cocaïne	3	3	0	3	0	3	0	0	1	9	12	3	9	24	4.72
Cannabis	42	18	27	51	36	54	33	39	34	66	87	202	111	400	78.74
benzodiazepine	0	0	0	0	0	0	0	12	2	6	0	3	15	18	3.55
Amphéta-mine	0	0	0	0	0	0	0	6	0	0	0	3	3	6	1.18

Community: Yop (Yopougon); Pla (Plateau); Coc (Cocody); Adj (Adjamé); Kou (Koumassi); Abo (Abobo); Mar (Marcory); Por (Portbouet); Trei (Treichville); Atté (Attécoubé). Social class: F (rich); M (medium class); D (poor). %: Percentage.

and since then the illegal business has continued to thrive. In 2003, Dano et al. (2003) reported seizures of 17.88 kg/year from 1991 to 1999 (Table 4); our study recorded seizures of 38.66 kg/year representing an increase of 116%. In 2009, Tigori-Sangare et al. (2011) showed that, like cannabis, benzodiazepines are highly consumed by users of psychoactive substances in the city of Abidjan.

Almost non-existent until 2005 when the first seizure of hashish was reported, an insignificant amount of 0.1 g was seized (Table 4). In general, a sharp decrease was observed in seizures from 2002 and a rise from 2005. The socio-political crisis which occurred in 2002 could be responsible for this increase in drug trafficking in Coted'ivoire.

Addiction in schools

A survey carried out in school is the best method of collecting information about drug abuse among young people. They are cost effective and questionnaires get across easily.

A survey was carried out on all the ten municipalities of Abidjan, 30 schools representing 3,000 students were involved. Of the students questioned, 508 have taken banned drugs at least once in their lifetime, which give a rate of 16.93%. The municipalities most affected by this scourge were Attécoubé (87 students, 29%), Abobo-gare (66 students, 22%), Port-bouet (66 students, 22%) and Yopougon (63 students, 21%). The rate of students who use drugs varies from 8 to 29% depending on the municipalities, which corresponds to an average of 51 students, or 17% (Table 5).

Two studies on drug use in schools by El-Amine (1993) and Manda et al. (2004) for the periods of 1983 to 1991 and 1991 to 1999, indicating the levels of drug consumption in schools reported an average of 10.75 and 13.4%, respectively. These figures are much lower than those observed during the period of 1999 to 2007, reflecting the persistence and even the rising trend of drug use in Ivorian schools.

At the international level, results obtained in Cote

d'ivoire are higher than the survey report on adolescents in Tunis (Tunisia) by Amrani et al. (2002) who reported that 13% of students admitted have used hard drugs at least once in their lives. However, our figures are lower than those obtained in Algeria and Madagascar, where more than 19% of high school students have had contact with hard drug (UNODC, 2007; Forem, 2006). The Institute of Statistic of Quebec (2007) reported an even higher result about 30% of Quebec students admitted to have used drugs during the school year. Among students who used drugs, a male predominance was noticed with a sex ratio of approximately 5:2 (70.66% boys and 29.34% girls) (Table 5). In Madagascar, UNODC (2007) also reported a higher male predominance of 83%. In Tunisia, Amrani et al. (2002) reported the same observation with a slight male predominance of 51.6% for boys against 48.4% for girls.

Regarding distribution by age, the highest consumption was found in age group of 18 to 20 years which was about 50% of the cases (Table 5). In Madagascar, UNODC (2007) conducted a similar study and reported a peak at the age of 19 for boys (23%) and 18 for girls. According to Mabrouk et al. (2011), 63% of cannabis smokers in Tunis are youths of age 19 to 25 years. In 2007, the European School Survey on alcohol and other drugs reported that 31% of 16 years old admitted have smoked cannabis in life (Legleye et al., 2009).

Regarding the place of residence, 78.74% of students' consuming hard drugs live in neighborhoods where drugs are easily circulated (Table 6). This result is similar to other studies conducted earlier in Abidjan by Manda et al. (2004) and El Amine (1993).

In this study, variation was observed in drug consumption of students based on the kind of social. Students from all social classes reported to have used drugs. This consumption is higher among students belonging to both the middle class and the less privileged ones with rates of 43.7 and 30.9%, respectively (Table 6). Social class is not a limiting factor for drug use, as consumers are from all walks of life. Hard drugs are consumed by students from all social class. Cannabis remains the most widely consumed drug. Apart from Indian hemp, students find it difficult to have easy access to heroin and cocaine, which

which remain too expensive in the black market (Table 7).

Factors contributing to hard drug consumption are many: sorrow, grief, timid ness, emotional conflict or prolonged internal conflict. On the psychological level, the use of drugs is an expression of juvenile in search for three things: experience, identification and pleasure.

In this study, 46.06% of the student consumers said to have been influenced by friends, 44.1% wanted to experience the effects that drugs provides and for the 9.24% remaining (school and family) problems are the main cause of their drug addiction (Table 6). According to UNODC (2007), in Madagascar, among students who have already touched drugs, half of them said they did so to satisfy their curiosity (49%), others puts the blame on friends or peer influence (23%). The drug can also be seen by young people as a way to forget some of the concerns and problems of adolescents: personal difficulties (0.6%), dissension within the family (43%), and heartbreak (3.5%). According to Mabrouk *et al.* (2011), the main reasons given by consumers of cannabis in Tunisia were: running away from problems (29.3%), searching for relaxation (20.2%), the need for experimentation (18.2%) and the search for pleasure (16.7%).

Conclusion

The production and trafficking of narcotics, drugs and psychoactive substances affect a large number of African countries, including Côte d'Ivoire. Our investigation has revealed the trafficking situation and the use of drugs in Côte d'Ivoire. It appears that the use of hard drugs remains a concern as evidenced by the numerous seizures of narcotics and psychotropic substances, despite the increased repression against trafficking. The situation is even more alarming that the sale of various types of drugs to students, even within schools, continues to thrive. This plague is characterized by a strong preponderance of cannabis. Thus, it appears truly as an absolute necessity on one hand, to strengthen the control and repression, on the other hand, developing awareness campaigns and prevention to both adults and youths in order to enhance their knowledge "say no" and inform them of the risk involve in taking hard drugs. As for parents, they should be more vigilant to be able to detect any changes in behavior among young ones and encourage dialogue with their children.

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Full Length Research Paper

River Opa - A potential agent for the dissemination of multiple-antibiotic resistant bacteria

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In the process of determining the bacteriological quality of water from the Opa River, samples were taken from the river at five different points on five separate occasions. These samples were analysed by the most probable number method and by filtration, and the bacterial isolates obtained were identified by standard methods. The isolates obtained were tested for their resistance to thirteen antibiotics using the disc agar diffusion method, and four of the isolates were further tested for their ability to transfer their antibiotic resistances by conjugation. The microbial load at the different sampling points ranged between 0.01×10^2 and more than 300×10^2 while the most probable number of coliforms in 100 ml of samples were in excess of 1,800 cfu. The organisms most frequently isolated from the samples included those of the Genera *Enterobacter*, *Enterococcus*, *Klebsiella*, *Flavobacteria*, *Proteus* and *Streptobacillus*. The Opa River was found to be contaminated along its length by multiply antibiotic resistant organisms, some of which had the ability to transfer their resistance to another organism. Antibiotics to which the isolates were resistant included tetracycline (100%), ampicillin (98.9%), cephalothin (95.5%), doxycycline (92.4%), chloramphenicol (25.8%), tobromycin (24.2%) and spectinomycin (21.1%). Approximately, 30% of the isolates were resistant to norfloxacin while 6.1% were resistant to ciprofloxacin. The transferable resistances included those to tetracycline, cephalothin, trimethoprim and erythromycin. The Opa River is a source of antibiotic resistant organisms, and the presence of such organisms in this body of water which is used for many purposes within the area suggests a means whereby these organisms and the antibiotic resistances which they carry can spread through the populations that come in contact with the river.

Key words: Antibiotic resistance, contamination, Opa River, South-Western Nigeria.

INTRODUCTION

Water is essential to life, as all biochemical reactions which initiate and maintain life take place in the aqueous environment of the cell so that, as pointed out by Nester et al. (2004) and Chaplin (2007), there can be no life in the absence of water. Water is a physiological requirement but more than this, it is also required for a

plethora of activities, some of which have been identified by Conway et al. (1996) as drinking, culinary purposes, bathing, washing, laundering, agricultural purposes, fire protection, fishing, swimming and other recreational activities, as well as navigation. By far, the most important use of water is drinking, and water used for this

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purpose has to be of good quality. According to The World Health Organization (1996, 2001, 2003, 2008), whilst water intended for human consumption should be pleasant to drink, coolness, absence of turbidity, colour and any disagreeable taste or smell must also be regarded as being desirable. In addition, such water must be free of chemical impurities as well as microorganisms, especially the coliforms which are associated with diarrhoeal diseases.

In developing countries such as Nigeria, most of the people have very restricted access to potable water supplies and rely primarily, if not solely on surface waters from rivers, streams, lakes, reservoirs, ponds and shallow wells for their daily water supplies. Nester et al. (2004), Environmental Protection Agency (EPA) (2007) and Tarver (2008) have however identified these bodies of water as habitats for a large number of microorganisms some of which may be pathogenic to humans. The most important sources of contamination in such bodies of water are human beings and animals which defecate in water meant for human consumption. Water may also be contaminated by the discharge of sewage and sediments into rivers and other water sources, which as pointed out by Atlas and Bej (1990), may also be contaminated with human and animal waste.

Organisms found in water, even when they are not pathogenic, may be carriers of antibiotic resistances and this issue, as pointed out by Ash et al. (2002) and American Public Health Association (APHA) (2004) has become one of global concern. The most frequently encountered antibiotic resistant microorganisms in fresh water are species of *Actinobacter*, *Alcaligenes*, *Citrobacter*, *Enterobacter*, *Pseudomonas* and *Serratia*, and various studies have reported the isolation of multiply antibiotic resistant organisms from fresh water sources (French et al., 1987; Ogan and Nwiika, 1993; Young, 1993; Ash et al., 2002), thus suggesting that such waters could be associated with the dissemination of antibiotic resistant organisms within communities which have access to waters in which these organisms are found.

Since water has been reported to be a source of antibiotic resistant organisms, the high and steadily increasing incidence of antibiotic resistant organisms which has been reported by Okeke et al. (2000) among others may be at least partly derived from organisms present in rivers, streams and other bodies of water within the study environment. This being the case, it was thought expedient to isolate organisms from the Opa River flowing through the semi-urban community of Ile-Ife and subject such organisms to antibiotic testing.

MATERIALS AND METHODS

Study site

River Opa serves a large population in some parts of Western

Nigeria, including the Obafemi Awolowo University (OAU), Ile-Ife, where the river has been dammed and the water treated to provide a source of pipe-borne water for drinking, domestic and other purposes within the university. The river's source is in Esa-Oke in Osun-state and flows through many towns and villages (Figure 1) before emptying into the Osun River at Asejire which has been dammed to supply water to Ibadan, a large and expanding city with a population in excess of 2 million people.

Collection, isolation and identification of bacteria

Samples of water from the Opa River were collected at five different points around Ile-Ife on five different occasions over a period stretching from 8th December, 2003 to 12th February, 2004 into sterile sample-bottles, and bacteriological examinations were made as described by the modified protocols of Ash et al. (2002). In collecting the samples, the bottle cover cap was aseptically removed from the sterile bottle which was clamped to the end of a stick. With the bottle mouth facing upstream, it was plunged downwards (about 30 cm) below the water surface, and then tilted slightly upwards to allow it to be filled completely before carefully replacing the cap. The bottle was labelled, placed in an insulated cold box and immediately transported to the laboratory for analysis.

In the laboratory, the detection and enumeration of thermo-tolerant organisms and presumptive *Escherichia coli* were performed by the modified standardized multiple tube (most probable number) methods described by Talaro and Talaro (2002), APHA (1998) and the International Organization for Standardization (ISO; 9308-2: 1990). On each sampling occasion, 105 ml quantities of water were distributed (five 10 ml double strength, five 1-ml single strength and one 50-ml double strength amounts) in bottles of sterile MacConkey broth purple (Oxoid, England) to which were added inverted Durham tubes for gas collection. Samples were incubated at 37°C for 24 ± 2 h. A positive test resulted in the production of acid (a yellow colour) and the number of tubes showing this result was counted and referred to the McCrady's probability table. Simultaneously, a positive presumptive test which constitutes a modified standardized method in microbiological examination of water, as described by APHA (1998) was also employed. Water samples were filtered through a 0.45 µm cellulose ester membrane and filters were placed on the surface of sterile dried MacConkey and Eosine Methylene Blue (EMB) agar media (Oxoid, England). Plates were incubated at 37°C for 18 h. All colonies that were cultured from the membrane filters were sub-cultured for pure isolates and identification of isolates was by conventional characterization (Ewing, 1986; Holt et al., 1994; Farmer, 1995).

Antimicrobial susceptibility tests

The standard disk agar diffusion method according to guidelines recommended by Clinical Laboratory Standards Institute (CLSI) (2006) was used for susceptibility testing with iso-sensitest (Oxoid, England) agar. The antibiotic disks used were: ampicillin (10 µg), chloramphenicol (30 µg), cephalothin (30 µg), ciprofloxacin (10 µg), doxycycline (30 µg), erythromycin (15 µg), nalidixic acid (30 µg), sulfisomidine (250 µg), streptomycin (30 µg), spectinomycin (25 µg), tobramycin (30 µg), trimethoprim (5 µg) and tetracycline (30 µg), all obtained from AB Biodisk, Sweden. Susceptibility break points were defined according to manufacturer's recommendations. An isolate was considered resistant if it had either intermediate or high-level resistance to an antibiotic. *E. coli* NCTC 10418 and K-12

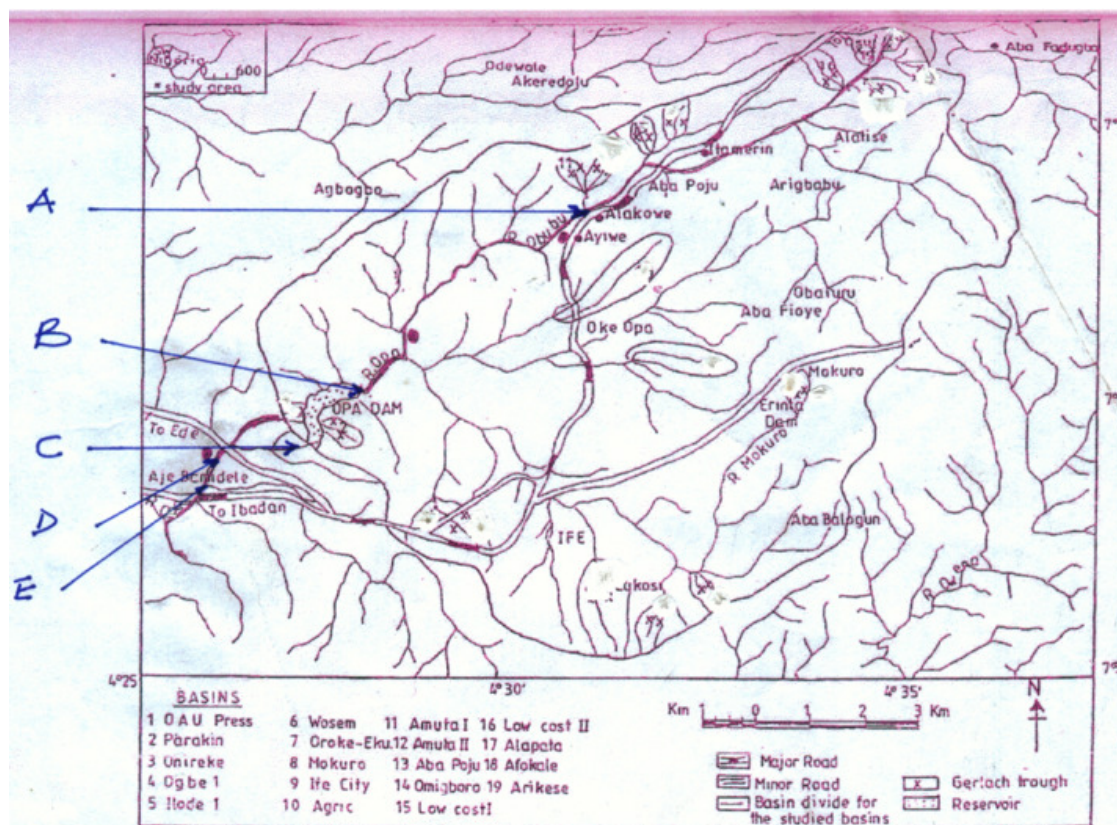


Figure 1. The study area and basins in Opa reservoir catchment. A: Alakowe (Opa); B: Road 7 Junction (OAU); C: campus gate, Ede Rd., immediately after the University dam; D: Ajebamidele before abattoir; E: after the abattoir.

C600 were used as controls.

***In vitro* transconjugation**

The protocol described by Sundström et al. (1987) was used to determine the ability of the isolates to transfer their antibiotic resistance to C600, a plasmidless strain of *E. coli*. Each isolate that was resistant to tetracycline was mated with *E. coli* C600. A 0.20 mL portions of the overnight cultures of both the donor and recipient were transferred onto surface of over-dried Iso-sensitest agar plates and the conjugation mixtures were incubated at 37°C for 24 h. Growth was harvested into a sterile test-tube and washed down with 3.00 mL portions of freshly prepared phosphate buffered saline (pH 7.2). The suspensions obtained were then streaked out on recovery plates (Iso-sensitest agar containing 40 mg/L of nalidixic acid and 40 mg/L tetracycline. Colonies growing after incubation at 37°C for 24 h were further sub-cultured for pure isolates on freshly prepared recovery plates. Authenticated trans-conjugants were then subjected to antibiotic susceptibility patterns in accordance to protocols described above (CLSI, 2006).

RESULTS

Twenty-five water samples were taken from the Opa

River at five different locations during the period under study Table 1. The organisms most frequently isolated in the course of this exercise were of the Genera; *Enterobacter*, *Enterococcus*, *Klebsiella*, *Flavobacteria*, *Proteus* and *Streptobacillus* (Table 2). Of the 66 bacterial isolates from the water samples tested for antimicrobial resistance, all (100%) isolates showed resistance to at least one of the antibiotics (Table 3). As shown, all the isolates were found to be resistant to tetracycline. Resistance to ampicillin was encountered in 65 (98.9%) of the isolates, whilst 95.5% of the isolates were resistant to cephalothin. Resistances to doxycycline (92.4%), erythromycin (89.4%), nalidixic acid (87.9%), trimethoprim (69.7%), sulfisomidine (36.4), chloramphenicol (25.8%), tobromycin (24.2) and spectinomycin (21.1%) were also observed. Approximately, 30% of the isolates were resistant to norfloxacin; however, only 4 (6.1%) of 66 were resistant to ciprofloxacin. The four isolates which were resistant to tetracycline but sensitive to nalidixic acid were able to transfer their resistance to C600, a plasmidless, nalidixic acid resistant strain of *E. coli*. All four isolates transferred

Table 1. Microbial load of River Opa at five (5) sampling locations during the period December, 2003 through February, 2004.

Date	Sampling location	CFU/ml ($\times 10^2$)	Coliform (MPN/100 ml)
8/12/03	A	0.01	>1800
	B	41	>1800
	C	16	>1800
	D	3.5	>1800
	E	>300	>1800
22/12/03	A	73	>1800
	B	>300	>1800
	C	2.1	>1800
	D	3.2	>1800
	E	12	>1800
14/01/04	A	36	>1800
	B	>300	>1800
	C	14.4	>1800
	D	2.8	>1800
	E	>300	>1800
14/02/04	A	37	>1800
	B	120	>1800
	C	14.8	>1800
	D	3.4	>1800
	E	>300	>1800
18/02/04	A	49	>1800
	B	180	>1800
	C	12.4	>1800
	D	4.4	>1800
	E	164	>1800

A: Alakowe (Opa); B: Road 7 Junction (OAU); C: Campus gate, Ede Rd., immediately after the University dam; D: Ajobamidele before abattoir; E: after the abattoir.

tetracycline resistance along with cephalothin, while two of them transferred both trimethoprim and erythromycin resistances along with tetracycline resistance. One of the isolates was able to transfer resistances to five different antibiotics.

DISCUSSION

Easy access to potable water is an important public health factor given the ability of water to encourage the spread of diarrhoeal diseases. This is of special importance in developing countries where water of good quality is often very difficult to find. Even in developed countries however, the availability of potable water can

no longer be taken for granted given the report of Ramirez and Williams (2004) that water supplies are becoming increasingly difficult to find all over the world. This difficulty is deemed to have been caused by increases in human population, increased per capita consumption of water; especially in developed countries and the impact of human activities on the global environment. The absence of appropriate technology in the developing countries is an added complication to this problem in those countries.

Even when there are facilities for water purification, the problem of adequate water supplies is still of pivotal importance as water meant for purification should not be grossly contaminated with coliforms. The work of Guardabassi et al. (1998), Sánchez-Pérez et al. (2000),

Table 2. Microbial isolates from River Opa at five (5) sampling locations during the period December, 2003 through February, 2004.

Date	Sampling location				
	A	B	C	D	E
8/12/03	<i>Klebsiella</i> spp., <i>Enterobacter</i> spp.	<i>Hafnia</i> , <i>Enterobacter</i> spp.,	<i>Xanthomonas</i> , <i>Enterococcus</i> spp., <i>Megasphaera</i> , <i>Actinomyces</i> .	<i>Cedecca</i> spp., <i>Streptobacillus</i> spp., <i>Enterobacter</i> spp.	<i>Enterobacter</i> spp., <i>Enterococcus</i> spp.
22/12/03	<i>Proteus</i> spp., <i>Flavobacterium</i> spp., <i>Enterobacter</i> spp.	<i>E. coli</i> , <i>Klebsiella</i> spp.	<i>Proteus</i> spp., <i>Staphylococcus</i> spp., <i>Enterococcus</i> spp.	<i>Cedecca</i> spp., <i>Streptobacillus</i> spp.	<i>Staphylococcus</i> spp., <i>Proteus</i> spp.
14/01/04	<i>Flavimonas</i> spp., <i>Flavobacterium</i> spp.	<i>Enterobacter</i> spp.	<i>Enterobacter</i> spp., <i>Enterococcus</i> spp., <i>Staphylococcus</i> spp.	<i>Streptobacillus</i> spp., <i>Nocardia</i> spp.	<i>Pseudomonas</i> spp.
14/02/04	<i>Enterobacter</i> spp., <i>Flavobacterium</i> spp., <i>Pseudomonas</i> spp.	<i>Enterobacter</i> spp., <i>Klebsiella</i> spp.	<i>Pseudomonas</i> spp., <i>Enterobacter</i> spp.	<i>Streptobacillus</i> spp., <i>Nocardia</i> spp.	<i>Xanthomonas</i> spp.
18/02/04	<i>Serratia</i> spp., <i>Enterobacter</i> spp., <i>Klebsiella</i> spp., <i>Actinobacillus</i> spp., <i>Flavobacterium</i> spp.	<i>Klebsiella</i> spp., <i>Enterobacter</i> spp.	<i>Enterobacter</i> spp.	<i>Cedecca</i> spp., <i>Streptobacillus</i> spp., <i>Nocardia</i> spp.	<i>Enterobacter</i> spp., <i>Actinomyces</i> spp.

A: Alakowe (Opa); B: Road 7 junction (OAU); C: Campus gate, Ede Rd., immediately after the University dam; D: Ajobamidele before abattoir; E: After the abattoir.

Table 3. Percentage of organisms resistant to the antibiotics used in study.

Antibiotic	Percentage resistant organisms
Ampicillin	98.8
Cephalothin	95.5
Tetracycline	100
Doxycycline	92.4
Nalidixic acid	87.9
Norfloxacin	30.3
Ciprofloxacin	6.1
Chloramphenicol	25.8
Spectinomycin	21.1
Tobramycin	24.2
Erythromycin	89.4
Sulfisomidine	36.4
Trimethoprim	69.7

Ensink et al. (2004) and Mazari-Hiriart et al. (2008) suggest that the variety as well as densities of human pathogens present in water are related to the population from which they originate, the waste water and treatment system, the diseases prevalent in the human population as well as contributions from agriculture, animal husbandry and industry. The isolation of various organisms derived from the gastro-intestinal tract in the course of this study suggests that the Opa River is contaminated along its length by faecal matter derived from the people and animals that have access to the river.

Workers in other parts of the world have made a similar observation in respect of organisms such as *Enterobacter*, *Enterococcus*, *Klebsiella*, *Proteus*, *Streptobacillus*, *Staphylococcus*, *E. coli*, *Pseudomonas* and *Serratia* (Niemi et al., 1983;

French et al., 1987; Roszak and Colwell, 1987; Ogan and Nwiika, 1993; Quintiliani et al., 1999; Ash et al., 2002) which have been isolated from various rivers in different parts of the world. The isolation of *E. coli* from the Opa River also suggests that the contamination of this river is probably continuous so that water from the Opa River should be regarded as a source of potentially pathogenic organisms which furthermore carry multiply antibiotic resistances and therefore are a danger to the people who live along the river. The danger posed by these organisms is exacerbated by the fact that many of these people do not have a source of treated water and must use the river water for many purposes, including drinking, thus the opportunity exists for acquiring water borne infections from the river.

Opportunistic pathogens such as those isolated in this study are naturally present in the environment and are not formally regarded as pathogens but they are able to cause disease in people with impaired local or general defence mechanisms, such as the elderly or the very young, patients with burns or extensive wounds, those undergoing immunosuppressive therapy, or those with acquired immunodeficiency syndrome (AIDS). Should water used by such groups of people contain large numbers of these organisms for drinking or bathing, it can lead to various infections of the skin and the mucous membranes of the eye, ear, nose, and throat. Examples of such agents are *Pseudomonas aeruginosa* and various species of *Flavobacterium*, *Acinetobacter*, *Klebsiella*, *Serratia*, *Aeromonas*, and certain "slow-growing" mycobacteria.

An important aspect of water contamination in this environment is the fact that the organisms isolated were all found to carry resistances to antibiotics. Similar findings have been reported from a number of natural and man-made environments (Pillai et al., 1997; Goni-Urriza et al., 2000; Roe et al., 2003; Oyediji et al., 2011) and these resistant organisms have been said to be either indigenous to, or introduced through natural or anthropogenic causes within the natural environments (Wegener et al., 1999; American Academy of Microbiology, 1999). It is particularly noteworthy that some of the resistant organisms isolated in the course of this study were found to transfer their resistance to a recipient organism so that even if the organisms themselves are not pathogenic, they are easily capable of transferring their resistances to frank pathogens within the gastrointestinal tract, this may be regarded as being one way through which antibiotic resistances are acquired by organisms infecting people living within this environment.

According to Okeke et al. (2000), the incidence of bacterial resistance within the study environment is large and growing, and even though antibiotics use is prevalent within the study environment, the volume of consumption is not large enough to explain the widespread incidence of antibiotic resistances. As the results of this study suggest, there are environmental sources of antibiotic resistant organisms within the study environment and the presence of such organisms in the water, which is used for many purposes within the area, suggests a means by which these organisms can spread through the populations that come in contact with the water. These results highlight the need for the provision of treated water to the people living along the banks of the Opa River. The distribution of adequately treated water within the study environment should be helpful in curtailing the spread of antibiotic resistant organisms within the area of study and indeed in other localities which suffer the same level of exposure to antibiotic resistant organisms.

Conclusion

The results of this study show that the River Opa which runs through many rural and semi-urban communities in Osun State in South-Western Nigeria is contaminated along its length with multiply antibiotic resistant bacteria, some of which are capable of transferring their resistances to other organisms. Infections with these antibiotic resistant organisms are likely to be difficult to treat and their antibiotic resistances when transferred into other pathogens or commensals, increase the reservoir of antibiotic resistances within the host, and by extension the community in which public health facilities are practically non-existent. The results of this study highlight the need for the provision of treated water to the communities along rivers like the Opa, and in the absence of such facilities, the need to educate the people about the dangers of using untreated water from rivers for drinking and other domestic purposes.

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Full Length Research Paper

Kurdish women's stories of abortion in Sanandaj, Iran

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Abortion is illegal in Iran, yet women go through the risks for various reasons. The purpose of this study was to explore the reasons why Kurdish women wanted to terminate their pregnancies, the methods used to induce the abortions, and their experience after abortion. The methodology for this study used a descriptive qualitative design. Five women with history of at least one induced abortion were interviewed in-depth for their abortion experiences. Reasons reported for induced abortions included financial problems, fear of people's views and pressure from the husband. Abortion methods included the use of prostaglandin and dilation and curettage. Post abortion effects were both physical (including pain and bleeding) and emotional (mainly guilt and regret). Findings from this study suggest that midwives must take responsibility of effectively counselling women both before and after induced abortions, which may be performed for a variety of reasons. Health care professionals need to provide couples with guidance for appropriate contraceptive usage. Abortion after-care for women with physical and emotional needs is also crucial.

Key words: Qualitative research, induced abortion, post-abortion experience.

INTRODUCTION

While termination of pregnancy has long been practiced and legalized in many developed countries, in Iran however, it is illegal except in cases where the woman's life is at risk or cases of foetal impairment (Mohammad-Alizadeh et al., 2009). This fact may influence women's reasons for and methods of abortion. Socioeconomic, psychological, and emotional issues are among factors that underpin women's decision to have their pregnancies terminated (Broen et al., 2005). Whether the abortion is legal or not, women experience different types of physical, psychological, and social effects (Alex and Hammarstrom, 2004). Indeed, induced abortion is a major concern for public health for it affects the quality of life of women in their reproductive ages (WHO, 2007). Of greater importance is the fact that it can cause long-term sexual and reproductive ill health (Koster, 2010 experience, particularly in developing countries where it). Moreover, it can lead to emotionally traumatic is

performed illegally and there is the fear of the legal repercussion and social stigma (Bahoh, 2009).

Until now, little has been known about the Kurdish women's experiences of induced abortion. It was, therefore, considered pertinent to obtain a deeper knowledge of this phenomenon. Against the backdrop of social, cultural and economic changes that have taken place in Kurdistan, a qualitative study would provide a better understanding of the women's experiences of induced abortion. Such knowledge can be useful in the prevention of unintended pregnancy and unsafe abortion.

Study purpose

The purpose of the present study was to explore the reasons for the methods used and the effects of abortion by Kurdish women who terminated their pregnancy.

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Table 1. Characteristics of participants.

Pseudonym	Number of children	Number of induced abortion	Age (when abortion was done)	Contraceptive method in use at time of unplanned pregnancy
Zhara	-	1	19	Birth control pill
Mahlagha	3	1	34	Withdrawal
Soybeh	1	1	27	Withdrawal
Fatemeh	-	2	30	Birth control pill; withdrawal
Hajar	2	1	35	Condom

METHODOLOGY

A descriptive qualitative design was the guiding methodology. The research took place over a seven-month period at the health-care centres of the Kurdistan University of Medical Sciences in Sanandaj, the centre of the Kurdistan province in the western part of Iran. Study participants were recruited from the maternity and family planning units in five health-care centres. The purposeful sample was taken from Kurdish women who had an experience of abortion one year before the interview. Before contacting potential participants, the researcher oriented midwives at the maternity and family planning units of the selected healthcare centres on the required criteria for choosing participants. Once identified, the midwives explained the purpose of the study and the interview process to the women. The criteria for selection of participants were being a Kurdish married woman, having an experience of illegal induced abortion, absence of mental disability, and the ability and willingness to describe their experiences. Subsequently, appointments for interviews between the researcher and the selected participants were arranged. Ethical issues, which included confirming the women's interest to participate in the study, providing verbal consent and assuring that the data would be kept confidential and used only for research were attended to. Participants were interviewed based on the date, time and place most convenient for them.

Interview

Participants had in-depth interviewed individually in their own homes or in a private room at the health-care centre. All interviews began with the same questions: 'Could you please tell me what your reasons for abortion were?' and this was followed with "how did you make the decision to have the abortion, what method did you use to induce the abortion, what positive or negative consequences have you had from the abortion, what physical and emotional consequences have you had from the abortion and how have you dealt with those outcomes?". All interviews were conducted in the Kurdish language by the first author who is a midwife. Each interview was tape-recorded with the woman's permission. The length of the interviews varied depending on the women's responses. Each interview took between 60 and 120 min (average 90 min).

All interviews were transcribed verbatim in the Kurdish language by the first researcher. Transcription accuracy was checked by a colleague who read randomly chosen transcripts while listening to the audiotape. The analysis was also undertaken from the Kurdish transcripts and only verbatim quotations presented in the writing for publication were translated into English.

Ethical considerations

Permission to conduct the study was received from the Kurdistan University of Medical Sciences. The participants were informed of

the purpose of the study, assured of confidentiality at the beginning of each individual interview, but not asked to sign a consent form. All participants were informed that their participation in the study was voluntary and that their real names would remain confidential. They were also reassured that their care would not be affected if they chose not to participate in the study. Moreover, they could withdraw from the study at any stage without offering explanations.

Data analysis

The women's answers to the interview questions were each summarized in narrative form using the interview guide. The narratives were compared for similarities and differences for (a) reasons for the abortion; (b) use of contraception; (c) decision-making process; (d) methods of pregnancy termination; (e) the physical and emotional effects on the women's lives; and (f) ways of dealing with any outcome. Findings were compared to previously published research.

RESULTS

The ages of the five women used ranged from 19 to 35 at the time of abortion, with an average of 29 years. Two women were nulliparous and three were multiparous with a range of 1 to 3 children and an average of 2.3 children when the abortion took place. One woman had two abortions, while the other four had one abortion each. More details are displayed in Tables 1 and 2.

Zahra was 19 years old at the time of her abortion. She was a nulliparous woman and was using birth control pill when pregnancy occurred. She gave three reasons for the abortion: financial incapability to care for a baby, the fear that what happened to her mother- having to lose her mother at childhood and thus had to be brought up by a step mother, would happen to her, and the third reason was fear of people's view. People's views had a tremendous impact on her. Having married for six months she then conceived would make her feel ashamed. Many women she knew had been married for more than 10 years yet had not conceived. She personally made the decision for abortion and then she convinced her husband who opposed the abortion. She discussed the possibilities of an abortion with a doctor. The doctor told her how and where to get the procedure. She paid the equivalent of approximately 1000.000 Rials to buy prostaglandin ampoule. However, she could not find anyone who could inject the ampoule for her due to illegality.

Table 2. Summary of abortion narratives.

Pseudonym	Reason for abortion	Who decided	Method	Physical outcome	Emotional outcome	Coping with outcome
Zahra	Financial problems- mother's life history - fear of people's view	Own decision and convinced her husband	Prostaglandin ampoule	Pain and vomiting	Regret and guilt	Resolve to not repeat again Alms giving to seek forgiveness from God
Mahlagha	Concerns about daughter's opinion- Financial problems	Own decision and husband agreed	Insertion a sharp piece of herbal stem in the cervix by a lady	Infection	Regret and guilt	Alms giving to seek forgiveness from God
Soybeh	Concerns about relatives' and neighbours' opinion, Financial problems	She considered and her Husband forced her	Prostaglandin ampoule	Bleeding and severe lower abdominal pain	Guilt and no regrets	Prayed to God for forgiveness
Fatemeh	Husband's pressure	Husband forced and hit her	1 st -Rupture of fetal sac; 2 nd - D and C	2 nd - Bleeding	Guilt and regret	Got pregnant
Hajar	Financial problems	She considered and her husband forced	D and C	Bleeding	Guilt and regret	Prayed to God for forgiveness

D and C; Dilation and curettage.

Despite she lacked the knowledge on performing the injection, she braved herself and personally injected the ampoule for 6 weeks into the pregnancy. She suffered severe lower abdominal pain and vomited for a few hours. For two days, she bled before the uterine contents were expelled. After abortion, she regretted very much and felt guilty over it. She promised herself that if she would get pregnant again she would not abort it.

Mahlagha was a 34-year old multiparous woman who had three children at the time of her abortion. She had used the withdrawal method when pregnancy had occurred. Her reason for an abortion was that she was ashamed of her daughter who on several occasions complained about their small family house that could not accommodate all the family members. There was

also the financial problem. When her menstrual period was 2 weeks late, she decided on her own to have an abortion and the husband agreed. She consulted a female neighbour who took her to an abortion provider's house to perform the abortion. She said that the woman inserted a sharp piece of herbal stem into her cervix. She experienced vomiting and severe fever and was hospitalized the following day. Her pregnancy was terminated by curettage due to infection and she had to stay for another three days after abortion. Mahlagha said that she experienced deep personal regret and guilt because of the abortion. She said it troubled her a great deal. She gave alms and asked forgiveness from God for the abortion because she believed it was a sinful act. To avoid another pregnancy she took oral contraceptive

pill.

Soybeh was a 27-years woman who was nursing a 16-months baby girl when she had an abortion. She had used withdrawal method when she got pregnant. She gave two reasons for her abortion. First, her husband forced her to terminate the pregnancy because he could not afford to care for another baby, secondly she felt ashamed and afraid of what her relatives and neighbours might think of her pregnancy as her baby was hardly 2 years. They might think she was desperate to have a boy that was why she could not wait. Her menstrual period was late for one month. After deciding to have an abortion, Soybeh asked one of her relatives to introduce the doctor who had performed the abortion for her. She said the doctor inserted the prostaglandin tablet

into her vagina but nothing happened. The following week the doctor prescribed the prostaglandin ampoules for her. She stated that twenty days after the injection of ampoules, she had heavy bleeding and severe lower abdominal pain. She had to be hospitalized and the uterine contents were expelled. Soybeh said she was not regretful but she felt guilty and asked forgiveness from God for the abortion because she believed it was a sin.

Fatemeh was 30-years old at the time of her second abortion. She was a housewife and nulliparous woman with a history of two induced abortions. She had her first abortion when she was 29 years old and the second one in the following year. At that time, she had been trying to avoid getting pregnant by using the contraceptive pill method. According to Fatemeh, her husband did not want her to have a child and he asked her to be kind to him. She stated she liked to be pregnant and told her husband she would not abort because it is a sin. But her husband had threatened to puncture her stomach with a nail and had beaten her. She had no choice but to agree to terminate the pregnancy. She feared her relationship with her husband would become worse if she objected. Her gestational age was 24 weeks for the first pregnancy when her husband asked her to do an abortion. Fatemeh consulted a female friend who introduced her to a person who could do the abortion for her. She stated that the person initiated the abortion by rupturing the fetal sac and the abortion was completed in the hospital after 2 days. Furthermore, before her second conception, she had used the withdrawal method. She consulted her friend who introduced her to a doctor in another city. Her pregnancy was terminated by dilation and curettage in another city. She said she bled for a week after abortion due to incomplete abortion. She felt guilty and got pregnant again after 7 months.

Hajar a housewife, was thirty-five years old at the time of her abortion. She is a multiparous woman who had three pregnancies, one ending in induced abortion. She had been using condoms for 4 years before she got pregnant. Financial reason was the main reason of terminating her pregnancy. Both she and her husband did not have the financial means to have this child and so they decided that she had an abortion. She was 6 weeks into the pregnancy. Hajar said her husband forced her to do abortion. After consulting with a relative and paying the equivalent of approximately 2000.000 Rials to a physician, the operation was performed by dilation and curettage procedure in a private office in another city. She said she bled for 2 weeks after abortion due to incomplete abortion. Hajar said she was guilty of the act and asked forgiveness from God.

DISCUSSION

In this study on abortion in Sanandaj, Iran, five women had told their stories relating to their experiences of

illegally induced abortion. From the narratives of these women, it is evident that most of them had similar experiences with respect to the reasons for the abortion, contraceptive use, decision-making, methods, and consequences. It is clear that all five women had a story about unintended pregnancy. There are indications that the contraceptive methods used were unreliable or failed to stop pregnancy. Similar findings were found by Nobili et al. (2007) and Speidel et al. (2007). Financial problems appear to be an important reason for abortion. Not being financially ready for a child has been found in studies such as those by Finer et al. (2005), Fawcus (2008), Hussey (2010) and Faúndes (2010). Deciding to abort because of husband's pressure is an equally important factor and has similarity with the studies by Zabin et al. (2000), Broen et al. (2005) and Becker et al. (2008). Disagreement over the pregnancy leads to partner conflict. As shown by Coleman (2007) in her study, conflict between husband and wife may logically arise during the decision-making period.

Societal influence in terms of people's perception of pregnancy plays an important role in women's decision to abort. This finding is also in agreement with previous studies (Sinha et al., 1998; Bennett, 2001). The decision-making process leading up to the abortion procedure is complex. Although the women can make their own decision regarding their pregnancy, husband's permission has to be sought, and at other times it is the husband who decides. However, it is oblivious that the male partner has a final say in the abortion decision-making. This strong male influence in such a feminine matter is probably due to the male dominance factor in the Kurdish culture. When the decision is made, it is the women who find someone to ask for help to have an abortion. This finding of study is accordance with other studies (Schuster, 2005; Hess, 2007).

The use of modern procedure seems to have been preferred by the women. Resorting to prostaglandin and dilation and curettage appear to be the choice when physician and medical doctors advise them. Prostaglandin is available at pharmacies. Women would even go to cities outside their vicinity if medical professionals are not available in their area (Behjati-Ardakani et al., 2005). The five women in this study described physical complication after using the abortion procedures. Mohammad-Zadeh and Fallahian (2004) also in their study in Iran described physical complication such as nausea, vomiting, diarrhea, lower abdominal cramps, and extensive vaginal bleeding, related to unsafe induced abortion. The participants also narrated that they experienced emotional consequences due to their abortion. They used words like regret and guilt. Three women dealt with their guilt by seeking forgiveness from God. One woman personally resolved never to have another abortion and the other one got pregnant. According to Trybulski (2005) and Bahoh (2009), illegality is one of the factors that can cause women to experience

negative emotions after abortion. However in countries where induced abortion is legal, only a very few of the women experience negative emotional consequences of induced abortion, instead most of the women feel relief (Major et al., 2000; Korcz, 2002; Kero et al., 2004; Trybulski, 2005; Kornfield and Geller, 2010).

A potential limitation of this study is that the five participants were Kurdish women in Sanandaj; the findings might have been somewhat different if women from other cultures were included. In addition, women might have difficulties in talking because of being sensitive issue, the stigma attached to the procedure and its illegality. The findings from this research is very informative, but may not be generalized for the entire Kurdish women because of the small participant number. Furthermore, it must be taken into consideration that a qualitative study implies interaction between researchers and participants, and that the researcher's pre-conceptions might influence interpretation of the material (Charmaz, 1995).

Conclusion

The findings of this study show that Kurdish pregnant women terminate their unintended pregnancies due to known reasons such as financial problems, partner conflict and society's views. While they wish to prevent their pregnancies with withdrawal and contraceptive pills, conception occurred. The psychological factor that affects women who wish to abort their pregnancy is to find a person who is capable and willing to perform the procedure in a country where abortion is illegal. Hence, there is always the fear of effectiveness and safety. They resorted to various means to terminate their pregnancies and afterward they experienced physical symptoms as pain, bleeding, and infection, and negative emotions such as guilt and regret. These women's stories contain several implications for midwives. Midwives caring for women in Sanandaj may be able to reduce the prevalence of induced abortions and its complications by counselling couples both before and after abortion. Midwives can increase women's awareness of methods and use of effective contraception and work to prevent unplanned and unwanted pregnancies. They should also inform the women about potential health effects of induced abortion. Furthermore, in cases where pregnancy is forced to be terminated, midwives can play a significant role in counselling to woman's family and finding solution to this problem.

Providing abortion after-care that includes education about culturally appropriate pregnancy prevention is fundamental to abortion prevention. Midwives also need to recognize the emotional and spiritual needs of post abortion women and provide nonjudgmental, culturally relevant care in a woman's preferred language or make referrals to people specialized in helping women who have difficulty coping emotionally. These findings are important markers for further research concerning women's

experiences of long-term mental and physical outcome, as well as midwives' perceptions about and their interaction with women seeking abortion or experienced induced abortion.

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Full Length Research Paper

Evaluating primary healthcare service revitalization interventions through a knowledge, practice and coverage survey in earthquake-affected areas in Pakistan

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The study evaluated a primary healthcare service revitalization project in the 2005 earthquake affected areas in northern Pakistan by comparing the 2010 endline survey results with the 2007 baseline. A two-stage stratified sampling was used to sample 3,000 households in Bagh district of Azad Jammu and Kashmir. The data indicates significant improvements in majority of the indicators including use of tetanus toxoid injections during pregnancy, postnatal care coverage, mothers' knowledge of danger signs in newborns, immunization coverage for children and infant and under-5 mortality rates. The endline survey child mortality rates in the intervention area are close to Pakistan's Millennium Development Goals (MDG) target for 2015, which indicates that revitalizing health systems can lead to considerable improvement in primary healthcare in Pakistan. Carrying out a before and after comparison in absence of a matching control group is an important limitation of this evaluation; nevertheless, the study clearly signifies the importance of health system reform in a post-disaster setting. Further research could consider the sustainability of the intervention without donor support and allow for time-series analysis of public health indicators.

Key words: Earthquake, primary health, revitalization, intervention, evaluation, Pakistan.

INTRODUCTION

On 8 October 2005, a devastating 7.6 magnitude earthquake shattered northern Pakistan, resulting in over 73,000 deaths and at least 69,000 severe injuries (Sullivan and Hossain, 2010; Halvorson and Hamilton, 2010; Elnashai, 2006). Mansehra and Bagh were among

the worst affected districts. In both districts, about 80% of the healthcare infrastructure was destroyed or severely damaged (PRIDE, 2008). People who survived the earthquake were in immediate and long-term need of healthcare. Providing basic healthcare services became

difficult with the completely devastated primary healthcare system (Chan and Griffiths, 2009).

In August 2006, the United States Agency for International Development (USAID) launched a four-year project namely Primary Healthcare Revitalization, Integration and Decentralization in Earthquake-affected Areas (PRIDE). It was implemented by a consortium led by the International Rescue Committee (IRC) with Management Sciences for Health (MSH) and Jhpiego as key partners. Family planning, reproductive health and child health were the three key intervention areas. The project aimed to strengthen management capacities of district health authorities, improve access to quality primary healthcare services, increase participation of communities in health service management and improve household level knowledge and care-seeking behaviours (PRIDE, 2008).

In 2007, the Population Council conducted a knowledge, practice and coverage (KPC) survey in intervention districts with the aim to generate baseline estimates on key health indicators. The survey was carried out in 1,496 households of Mansehra and 1,473 households of Bagh (Afridi et al., 2007). Three years later, as the project was coming to a close, Oxford Policy Management (OPM) conducted an endline survey to generate estimates of the same indicators that were reported in the baseline survey. The same design and methodology were used in both surveys in order to provide a comparative analysis and to see any identifiable trend in the key health indicators where the project had intervened.

MATERIALS AND METHODS

Study site

It was planned that the endline survey would be carried out in both Mansehra and Bagh districts. However, in early 2010, the security situation in Mansehra seriously deteriorated and the survey team had to draw the entire sample from Bagh. Bagh is a district in Azad Jammu and Kashmir with a population of about 500,000 and land area of 1,368 square-kilometres (Figure 1).

Sample size and sampling

The sample size calculation during the baseline survey estimated that 3,000 households would be sufficient to detect a significant change in key indicators at 95% confidence. A two-stage randomized cluster sampling strategy was adopted. In the first stage, 120 randomly selected primary sampling units (PSUs) are enumeration blocks in the urban domain, and villages in the rural domain. All households in each PSU were listed. In the second stage of sampling, 25 households were selected from each PSU by systematic random sampling.

Data collection instruments

Three sets of questionnaires were used. The household questionnaire

captured information on demographic and socioeconomic characteristics of the household. The women questionnaire captured core indicators on contraception, reproductive and child health. The semi-structured community questionnaire was administered to a group of community leaders to capture general information about the community, availability of health services, involvement of the community in health planning, design and management at local levels, and perceptions towards changes in the quality of services in government health facilities.

Data collection

Six survey teams collected the data within four weeks. Prior to that, they received eight days' training, including field tests. Each team was composed of one female team leader, five female interviewers and one male interviewer. Strong quality-control processes were maintained. Randomly sampled subsets of households were re-interviewed using a shorter version of the questionnaire to validate the quality of collected data.

Data management and analysis

Data were double-entered using CSPro, and pre- and post-entry checks were carried out. Data analysis was done using statistical package for social sciences (SPSS) and Stata. Descriptive statistics were used to generate the data tables. To check the statistical significance of differences in key indicators, the baseline and endline survey results data were compared at the 95% confidence level. A p-value < 0.05 was considered significant. Confidence intervals and p-values were generated taking the cluster size and design effect into account. The infant mortality rate (IMR) and the under-5 mortality rate (U5MR) were calculated by the direct mortality estimation method using life tables (Rutstein and Rojas, 2006).

Ethical considerations

Participation in this survey was voluntary and informed verbal consent was obtained from all respondents. They were informed that they could skip any questions they did not wish to answer and had the right to withdraw from the interview at any time. Respondents were not offered incentives of any kind to take part in the survey. No biological sample was obtained as part of the survey. Data were kept strictly confidential, with only the researchers associated with data management and analysis having access. Personal identifiers were not revealed in any form in the report or dissemination.

RESULTS

This article summarizes the findings of the endline survey. The endline estimates are compared with the baseline estimates collected through the baseline survey carried out in 2007. The baseline results reported in this article are taken from the baseline survey report (Afridi et al., 2007).

Demographic characteristics

In the endline survey, 2,955 households were interviewed



Figure 1. Map of Pakistan showing the study area.

and results were compared with the data collected from the 1,473 households interviewed in Bagh in the baseline survey (Table 1). The total number of household members in the endline survey was 21,165, and of them 10,600 (50%) were female (Figure 2). The mean household size was 7.2 and the mean \pm standard error (SE) age of household members was 25 ± 0.13 years. A total of 2,437 ever-married women of reproductive age (15 to 49 years) were interviewed in endline among whom 2,343 (96%) were currently married. The mean age of marriage was 19 years, with 185 (8%) women having married below the age of 15 years. In baseline, out of the 1,483 ever-married women, 182 (12%) married below the age of 15 years.

Family planning

In endline, a total of 2,343 currently married women of reproductive age were interviewed regarding their family-planning practices, and results were compared with the 1,421 counterparts of baseline. The surveys did not find much change in respondents' knowledge of contraception. Knowledge of female sterilization, oral contraceptive pills and injectable contraceptives was more than 90% in both surveys. Knowledge of condom use had slightly

improved from 77 to 80%. Less than 30% of respondents in both surveys were aware of male sterilization and contraceptive implants. In the endline survey, 26% of currently married women were using some form of (modern or traditional) contraceptive method, including 22% who were using modern methods. The rate of use of modern methods was 18% during the baseline survey. Condoms (8%), female sterilization (5%), injectable contraceptives (4%) and intrauterine devices (3%) were the most common modern contraceptive methods. Both surveys found government health facilities to be the most common source of contraceptive materials (52% in baseline and 47% in endline).

In the baseline survey, 11% of respondents reported receiving their last contraceptive from Lady Health Workers (LHWs); in endline, this increased to 27% (p -value < 0.01). Dependence on private facilities for contraceptive supplies declined significantly from 25 to 19% (p -value < 0.05). Respondents who were not using any contraceptive method were asked about their future intentions regarding the use of contraception. A statistically significant change was noticed, with 71% of non-users in the endline survey expressing intentions for future use, compared to 65% in the baseline survey (p -value < 0.01). Women who reported either that they did not want any more children, or that they wanted to delay their next birth but were not using any contraception, were considered to have an unmet need for family planning. While the unmet need for spacing had dropped, the overall unmet need for family planning had increased (Figure 3).

Reproductive health

In the endline survey, 1,203 currently married women of reproductive age who had had a live birth during the preceding three years were interviewed. In baseline, 703 respondents took part in this part of survey. Seventy-four percent of eligible women had at least one antenatal care (ANC) visit in endline compared to 70% in baseline (p -value = 0.3). The subsequent ANC visit rates gradually declined both in the baseline and endline surveys, and were 29 and 30%, respectively for the fourth ANC visit. Half of the respondents of the baseline survey reported visiting private facilities for ANC. This figure had dropped to 37% in the endline survey (p -value < 0.01). More care-seekers sought ANC visits for preventive reasons than for curative reasons (Figure 4). Half of the mothers had one tetanus toxoid (TT) injection during their last pregnancy in the baseline survey compared to 63% in the baseline survey (p -value < 0.01).

In the endline survey, 36% of deliveries were institutional, a rate which is 2% higher than the baseline

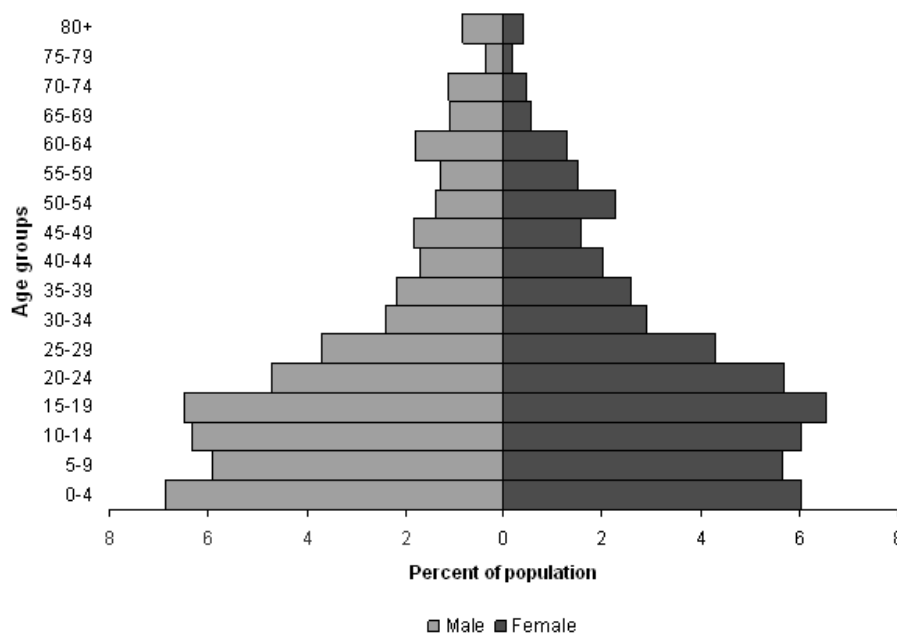


Figure 2. Population pyramid of Bagh district, 2010 from the endline survey.

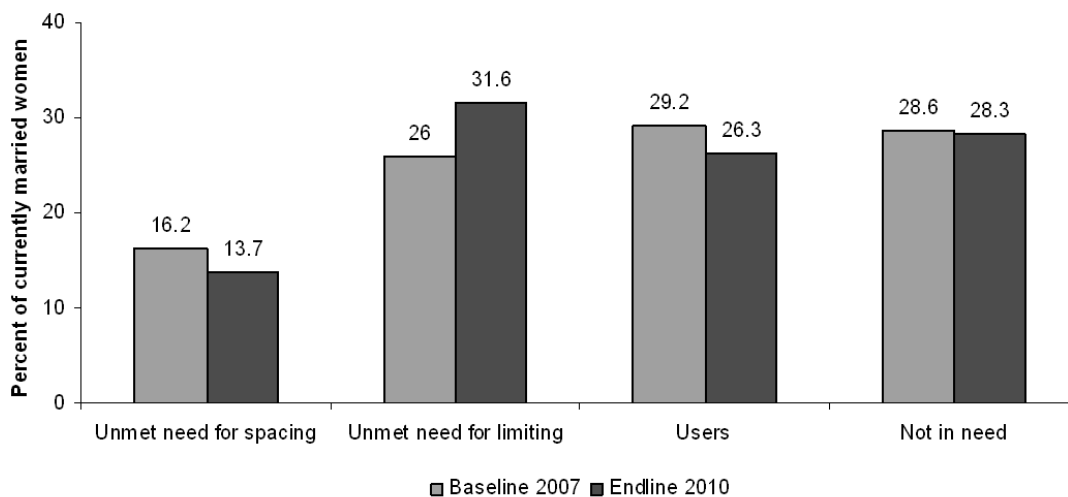


Figure 3. Unmet needs for family planning of currently married women of reproductive age.

survey (p-value = 0.3). In 461 and 769 home deliveries, respectively in baseline and endline, the use of a safe delivery kit increased from 11 to 16% (p-value < 0.05), the use of boiled thread to tie the cord increased from 7 to 13% (p-value < 0.01) and the use of a blade to cut the umbilical cord from 52 to 54% (p-value = 0.46). In the endline survey, 38% of deliveries were assisted by skilled birth attendants (physicians, nurses, midwives or lady

health visitors) compared to 36% in baseline.

One-third of the endline survey respondents reported that they had received postnatal care (PNC) in the endline survey compared to 25% in the baseline survey (p-value < 0.01). Mothers were significantly more knowledgeable about the danger signs in newborns; in the endline survey, 83, 72 and 48% knew one, two and three dangers signs, respectively compared to 58, 36 and 15%

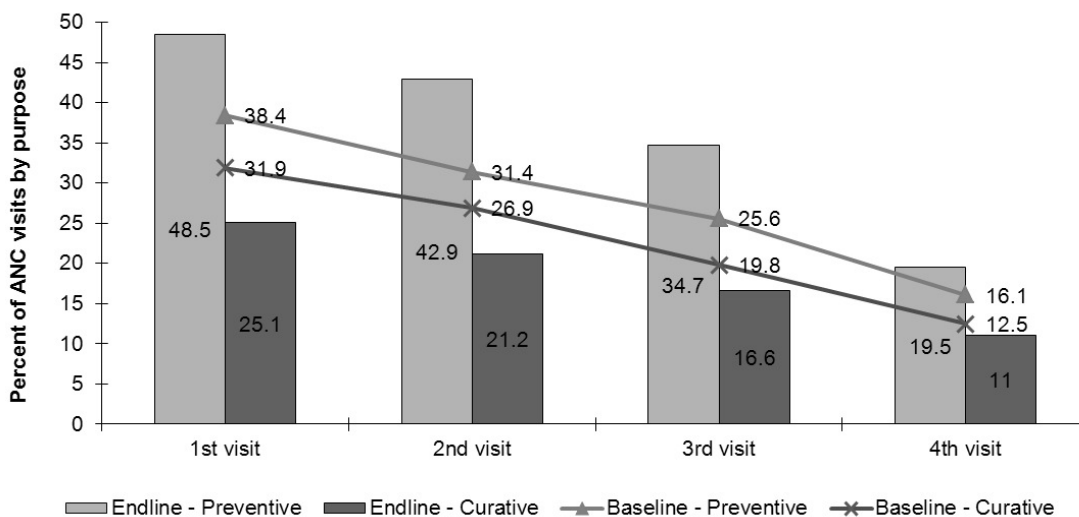


Figure 4. Proportion of antenatal care by preventive and curative purpose.

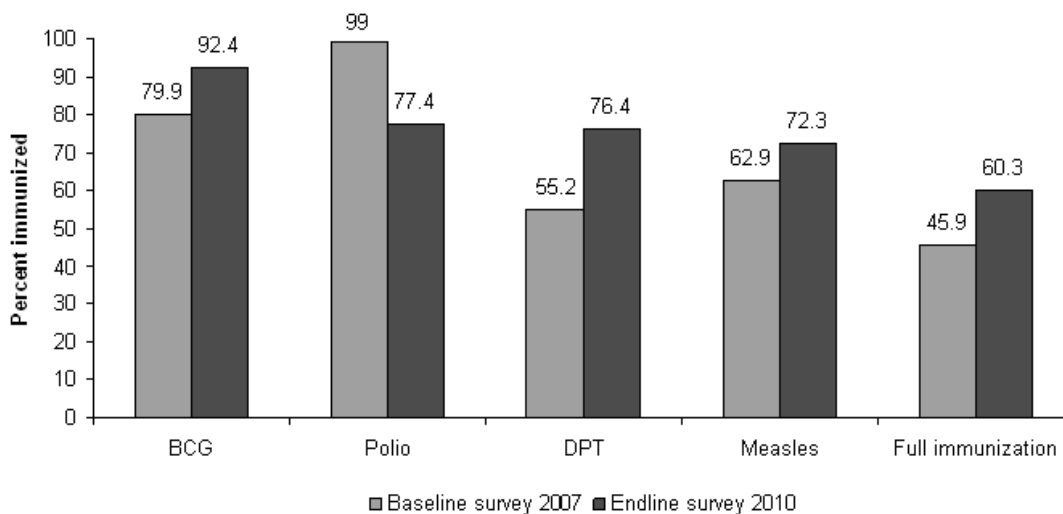


Figure 5. Immunization coverage of 12 to 23-month-old children.

in the baseline survey (p-value < 0.01).

Child health

The endline survey collected data on immunization of 368 children aged 12 to 23 months compared with 191 children at baseline. In the baseline survey, 88 (46%) of 191 eligible children were fully immunized compared to 222 (60%) of 368 eligible children in the endline survey

(p-value < 0.01). A child was considered fully vaccinated if she/he received one dose of bacille calmette Guerin (BCG) vaccine against tuberculosis, three doses of diphtheria, pertussis, tetanus (DPT) for diphtheria, pertussis and tetanus, three doses of oral polio vaccine (OPV) for polio, and one dose of measles vaccine. There were significant increases of individual coverage for the three vaccines (Figure 5); 13% for BCG (p-value < 0.01), 21% for DPT (p-value < 0.01), and 9% for measles vaccine (p-value < 0.05). However, the endline survey OPV

OPV coverage rate dropped by 22% (p-value < 0.01).

Mothers were asked about incidences of diarrhoea and pneumonia in their children. In the endline survey, 25% reported that their children had suffered from diarrhoea in the preceding two weeks, compared to 34% in the baseline survey. The diarrhoea was treated with oral rehydration therapy (ORT) in 64% of cases compared to 54% (p-value = 0.1) in the baseline survey. Mothers were also asked about the danger signs of diarrhoea; 80% knew at least one danger sign, a figure, 2% higher than in the baseline survey (p-value = 0.72). Although more than 90% of mothers, both in the baseline and endline surveys, had heard the term 'pneumonia', the majority of them were not aware of the symptoms of it; 53% were aware of fast breathing and 33% knew about chest in-drawing in endline, compared to 49 and 28%, respectively in baseline. There were significant reductions in childhood mortality rates. The calculated infant and under-5 mortality rates were 70 and 99, respectively per 1,000 live births per year during the baseline survey. These rates dropped to 44 for infants and 52 for under-5 children per 1,000 live births per year during the endline. Non-overlapping confidence intervals indicate that the differences were statistically significant.

DISCUSSION

In 2006, the earthquake-affected areas of Pakistan were in pressing need of rebuilding the healthcare system. Over the last few decades, there has been a worldwide interest in health systems reform for better equity and efficacy (Frenk, 1994). It is believed that there is a significant window of opportunity during a post-disaster period for revamping health systems (Clark, 2010). Better availability of resources from national and international sources and increased community acceptance are the key factors in favour of this opportunity. For example, the 1985 earthquake in Mexico City led to the reconstruction of a universal and equitable healthcare system (Soberon and Sepulveda, 1986). Nevertheless, there are many practical challenges in reviving a ruined health system. Even in the USA, the reform of the healthcare system in hurricane-affected Louisiana was controversial (Clark, 2010). It is also difficult to gauge the effectiveness of reforms and to assess their targeting efficiency. Two recent articles on the public health sector in earthquake-affected Haiti reflect this subjectivity. One states that:

"Fortunately, progress has been made in public health during the past year... the foundations of a functioning public health system are beginning to coalesce" (Dowell et al., 2011), while the other article noted, *"ten months after the earthquake in Haiti, the beleaguered public health system is worse than ever"* (DeGennaro et al., 2011).

This signifies the importance of independent evaluations to measure the success of health system reform, particularly in post-disaster settings where 'perceptions' and 'interpretations' widely vary. The PRIDE project implementers identified this need and funded the evaluation surveys to see the changes before and after the health system reforms in the intervention areas.

An overall look at the key indicators shows a positive trend in most of the areas of intervention during the project period (Table 2). This indicates that the project successfully revitalized, integrated and decentralized the primary healthcare system in the intervention areas. It also supports existing knowledge that reforming primary healthcare systems can have a significant impact on the health and wellbeing of communities. A group of researchers from the University of Michigan and the World Health Organization recently carried out a systematic review to see the contribution of primary care initiatives to health and health systems in 14 low- and low-middle-income countries and found evidence of three major benefits of primary health system reform (Kruk et al., 2010). Firstly, initiatives targeted to primary healthcare can improve access to healthcare, including among the poor, at a reasonably low cost. Secondly, they can reduce child mortality and, in some settings, reduce wealth-based disparities in mortality. Finally, primary care is the most effective platform for health-system strengthening (Kruk et al., 2010). The PRIDE interventions in the primary health sector in earthquake-affected Bagh district are in concurrence with the above conclusions, as evidenced by the increased rate of service utilization and reduced childhood mortality rates.

Out of 20 key indicators, 16 (80%) saw positive change from the baseline to the endline survey, with 11 (55%) of these being significant. The only key indicator that had a statistically significant negative change was the completed (three doses) polio vaccine coverage. It is unclear what caused this contrasting change in this particular vaccine. The universal (99%) adherence to three doses of polio vaccine reported in the baseline survey is unusual in the context and it may be possible that this data was misreported during the baseline survey.

A large decline was noticed in childhood mortality rates. The endline survey mortality rates were close to Pakistan's target MDG-4 target levels for 2015, which are 40 and 52 per 1,000 live births for infant and under-5 mortality rates, respectively (Government of Pakistan, 2004). Recent studies have identified Pakistan as having made insufficient progress in achieving MDG-4 (Bhutta et al., 2010). The mortality rates from the intervention district suggest that reforming the primary healthcare sector could enable Pakistan to achieve its health-related MDGs. The large changes in the mortality rates are concurrently optimistic and surprising, and the researchers spent substantial amounts of time and worked with senior

Table 1. Study population of baseline and endline surveys.

Parameter	Baseline survey 2007	Endline survey 2010
Clusters/PSUs	59	120
Urban blocks	3	8
Rural villages	56	112
Sampled households	1,500	3,000
Interviewed households	1,473	2,955
Household members	9,941	21,165

Table 2. Comparison of key indicators between the baseline and endline surveys with confidence interval (CI).

Indicator	Sub-indicator	Baseline survey 2007		Endline survey 2010	
		%	CI	%	CI
Contraceptive prevalence rate	Modern method	18.2	15.9-21.2	22.0	19.5-24.4
	Any method	29.2	26.2-32.4	26.3	23.8-28.8
Antenatal care	At least one visit	70.3	65.4-74.6	73.6	69.0-78.3
	Four or more visits	28.6	24.0-33.5	30.4	26.8-34.0
Tetanus toxoid injection in pregnancy	At least one injection*	50.2	44.8-55.7	63.4	59.5-67.3
	Two or more injections*	44.2	39.0-49.6	54.6	50.4-58.7
Delivery attendant	Skilled birth attendant	36.3	31.6-41.2	38.1	33.9-42.2
Postnatal visit	At least one PNC*	24.6	21.3-28.2	33.3	29.6-36.9
Knows danger signs in newborns	At least one sign*	58.0	52.9-62.5	83.3	80.4-86.2
	Three or more signs*	15.0	12.2-18.2	47.5	43.0-52.1
Immunization	Fully immunized*	45.9	38.1-53.9	60.3	54.9-65.7
	BCG*	79.9	73.3-85.2	92.4	89.7-95.1
	Polio**	99.0	95.8-99.8	77.4	72.7-82.1
	DPT*	55.2	47.2-62.8	76.4	71.4-81.3
	Measles*	62.9	55.3-69.9	72.3	68.0-76.6
Danger signs of diarrhoea	ORT in last bout	54.2	45.6-62.7	63.9	57.0-70.9
	Mother knows one sign	80.2	75.4-83.4	78.4	74.9-81.9
Pneumonia	Mother had heard about it	91.4	88.3-93.8	90.9	88.6-93.2
Mortality rates (per 1,000 live births)	Infant mortality rate*	69.8	57.9-81.7	43.7	34.0-53.4
	Under-5 mortality rate*	99.4	81.7-117.1	52.3	38.5-66.1

demographers to rule out possible data and analytical errors. The researchers came to the agreement that the data were properly collected, the sample size was sufficient and the analyses were correct. Several factors may have influenced this unusual decline. There could have been high perinatal and infant mortalities during and

just after the earthquake, resulting in a relatively higher baseline survey rate. The unusual notch in the population pyramid for the 5 to 9 years age group supports this assumption (Figure 2).

There are some important limitations of this study. Firstly, an experimental design with control groups in both

the baseline and endline surveys could have allowed a more rigorous impact evaluation. Having a control group could be useful to determine the 'counterfactual', which is the outcome in the subject in the absence of the intervention (Khandker et al., 2010). However, since both the worst effected districts of the 2005 earthquake were included in the intervention, it would have been very difficult to find a matching control for this evaluation. Secondly, the project was designed to re-establish and then develop government-supplied health services provided out of fixed facilities. Services provided out of fixed facilities do not necessarily cover the whole population of a district. Thus, whilst the comparative analysis of baseline and endline survey data gave a useful view of the trends in key health indicators, it can only provide a general indication of the impact that the PRIDE project might have had. A facility-based survey combined with a population-based survey would have provided more comprehensive insights into project outcomes and impact. Comparing the baseline and endline survey results from both Bagh and Mansehra district would have been very useful which was not possible because of security conditions in Mansehra at the time of the endline survey.

The PRIDE project is a good example of the effective reform of primary healthcare and its subsequent effects on the health and wellbeing of the people. In July, 2010 the international agencies funding and coordinating the project handed over their roles to local authorities and withdrew their direct support on the project. There are concerns regarding sustainability of interventions after the withdrawal of donor support (Winter, 1993). On the other hand, there are arguments that flexibility and ownership increases without donor support (Victora et al., 2004). It would be useful to assess the sustainability of the PRIDE interventions in the project areas four years after the endline survey. A follow-up survey in 2013, using the same methodology in the same study area, could generate important information on trends in primary health indicators in the intervention areas and would also allow interesting time-series analysis of three sets of survey data at four-year intervals.

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ABBREVIATIONS

KPC, Knowledge, practice and coverage; **IRC**, international rescue committee; **PRIDE**, primary healthcare revitalization, integration and decentralization in earthquake-affected areas.

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Full Length Research Paper

Intraorganizational human resource auditing of Ashas in Harahua block of Varanasi

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Intra-organizational auditing of human resource (AHR) evaluates personnel skill inventory in the organization towards identifying workers' potential and capabilities for desired output. Thus, it is mandatory that such evaluation of Accredited Social Health Activists (ASHAs) by respective Auxiliary Nurse Midwives (ANMs) could explore output components. The objectives of this study were to (1) obtain quantitative assessment of ASHAs by respective ANMs for pre-identified job competencies, namely, work aptitude, work culture and community involvement; (2) study the relationship between various attributes and socio-demographic factors with the overall job competency of the ASHAs. Twelve attributes for ASHAs' AHR on a 3-point Likert scale, designed by 4 experts, were selected through factor analysis after pretesting and clubbed into three job-competency groups, namely, five attributes for 'work aptitude' evaluation, four for 'work culture' and three for 'community involvement'. The 42 ANMs of Harahua block, Varanasi were trained by the researcher using a Fish Bowl Technique for homogeneous decision making while recording response to the attributes. The intra-organizational AHR was conducted by them on 209 ASHAs. In order to study the correlations, information from 97 ASHAs was collected. Less than 50% score was obtained by 28.2% of the ASHAs. 'Self-initiative' was observed to be significantly poor (<0.01). 'Situation adaptability' and 'programme compliance' differed significantly from 'attendance' and 'punctuality'. 'Leadership' and 'community relationship' scores had significant difference (p=0.002).

Key words: Intra-organizational human resource audit, skill inventory of ASHA.

INTRODUCTION

Auditing of human resource (AHR) is aimed at evaluating the skill inventory of personnel in any organization to identify their potential and capabilities (DeCenzo and Robbins, 2002). The skill inventory includes data about each employee's working style, knowledge, productivity, involvement, etc. Supervision and individual performance evaluation have been identified as important components for supporting community health worker programmes (Crigler et al., 2011). An understanding of these aspects of AHR might give an insight into issues like job

adherence and attrition, and explore the scope for training improvement (Delta Publishing, 2006). In the context of contemporary global urge to stir high impact health interventions through lower cadres of skilled and partially skilled community based workers (World Health Organization, 2008), India is not left behind. This is quite evident for the grass-root level workers, namely, the Accredited Social Health Activist (ASHA), Auxiliary Nurse Midwife (ANM), Anganwadi Worker (AWW) trio, where conceptual clarity is usually unasked for and more value

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is given to job dexterity (Mohapatra and Sood, 2003).

Various national health programmes, in order to make on-the-job assistance possible, have trained workers and managers from all tiers of the hierarchy. While this 'excessive layering' risks creation of near-equal workers and managers leading to friction, insubordination, unaccountability and blame shifting within the organization (Jaques, 1990), it seems to have turned out positively. Despite the fact that mutual non-linkage and insecurity has been cited (Haider et al., 2008), the trio usually maintain a healthy interaction (NHSRC, 2011). Unfortunately, even if majority of on-the-job training of ASHA is conducted by her ANM (a critical working relationship), the latter was neither officially recognized as a supervisor nor trainer of the ASHAs; thus, compromising the scope to improve the ASHA's performance (Bajpai and Dholakia, 2011). As the importance for supportive supervision is being vividly realized, it is logical to believe that intraorganizational continuous evaluation of ASHAs by respective ANMs should be a synonymous approach to generate improvement possibilities (Khatidja et al., 1993).

Thus, the present study was undertaken with the following objectives:

- (1) To obtain quantitative assessment of ASHAs by respective ANMs for pre-identified job competencies, namely, work aptitude, work culture and community involvement;
- (2) To study the relationship between various attributes and socio-demographic factors with the overall job competency of the ASHAs.

MATERIALS AND METHODS

This study was conducted in Harahua Community Development Block of Varanasi district, Uttar Pradesh from January to June, 2011. The 209 ASHAs of the block were identified and mapped along with their 42 ANMs. A set of job-performance attributes of ASHA was derived by a panel consisting of the senior-most professor of Community Medicine in Banaras Hindu University (BHU), an associate professor from the Faculty of Management Studies, BHU (both co-authors), Additional Chief Medical Officer In-charge (Health Programmes), Varanasi and the Medical Officer In-charge, Primary Health Centre, Harahua. Each attribute was scaled on a three-point Likert Scale, namely, poor, average and good and scored with positive semantic differentials (Osgood, 1957). A proforma was, thus, designed to be self-administered by the ANM. The attributes were pretested on 10 ANMs of adjacent Chiraigaon Community Development Block and 12 attributes were selected through factor analysis and were clubbed into 3 job-competency groups based upon experiential reasoning by the authors: five attributes for work aptitude evaluation, four for work culture evaluation and three for evaluating community involvement of the ASHA. The 42 ANMs were trained in three workshops to make them understand the meaning of each attribute followed by a fish-bowl technique exercise for appropriate scoring.

In order to study the correlations, a sampling frame of all ASHAs was prepared in alphabetic order. Each alternate ASHA was selected for the purpose of analysis. Information for 97 ASHAs was validated by the software and hence included in the study. Data obtained was analyzed with MS Excel 2007 and Statistical Package for Social Sciences (SPSS)v16.0 using apposite statistical tests.

RESULTS

Table 1 shows the scores obtained by the ASHAs for different attributes with comparison across job-competency groups. The ASHAs had obtained significantly lower scores for 'self-initiative' as compared to other attributes that had been clubbed into the 'work aptitude' group. Even as the ANMs considered at least half of the ASHAs as fairly 'dependable' (50.2%) and appreciated their 'work style' (53.6%), almost every fourth ASHA was ranked as "poor" when it came to 'knowledge'. Around 55% ASHAs were found to have either average or even inferior scores for their 'productivity'. The variance in the scores given by the ANMs was least for 'self-initiative' and 'productivity' indicating consistent alignment of their opinion for these attributes. In the 'work culture' group, ASHAs were more frequently adjudged as "poor" for their 'situation adaptability' and functional compliance to the training given to them under different health programmes (19.6%) each. 'Punctuality' and regular 'attendance' at work had fetched the ASHAs significantly higher scores than the other two afore-mentioned attributes ($p=0.006$ at least and $p<0.001$ in most combinations). In the 'community involvement' competency, ASHAs fared exceptionally when it came to 'community relationship' (2.47 ± 0.721 ; over 60% ASHAs ranked "good"). The variance was also acceptably minimal (0.519) highlighting the similar views from most of their on-field intraorganizational auditors, that is, the ANMs. A significant difference was noted between the mean scores obtained for ASHAs' 'leadership' capability when compared with her 'relationship with the community' ($p=0.002$). 'Communication' skills formed a bridge between the two attributes with a mean score of 2.31 ± 0.762 .

The overall mean scores obtained in the different job competency groups were compared (Figure 1). It was found that there existed a significant difference across the groups ($p<0.001$). ASHAs had obtained low scores for 'work aptitude' as compared to 'work culture' (mean difference in scores with post-hoc Bonferroni= 0.179 ; $p<0.001$) and 'community involvement' (mean difference in scores with post-hoc Bonferroni= 0.161 ; $p<0.001$).

As shown in Table 2, a significant positive correlation was found between the size of service population and the ASHA's total AHR score ($p<0.001$). Increasing age seemed to have a significant inverse linear relationship with the total score ($r=3.0$, $p=0.003$), but this could explain only up to 9% of the variability (Figure 2). Distance from the mother Primary Health Centre (PHC) as well as years of experience as ASHA had no significant effect on the total score ($p=0.121$ and 0.806 , respectively).

Two indicators were considered in this study as proxies for estimating the economic standing of the ASHA: colour of ration card (red, yellow or white) and type of residence (kutcha, semi-pucca or pucca). However, ASHAs performance

Table 1. Mean scores of ASHAs for different attributes with intra-group comparison (n=209).

S/N	Attribute	AHR ranking by ANM			Mean±SD	Variance	Within group	
		Poor	Average	Good			ANOVA	Sig. with Bonferroni
Job competency group: Work aptitude								
1	Work Style	48 (23.0)	49 (23.4)	112 (53.6)	2.31±0.822	0.675	F=13.754 P<0.001	MD ₁₋₂ =1.000; MD ₁₋₃ =0.111; MD ₁₋₄ =1.000; MD ₁₋₅ <0.001; MD ₂₋₃ =0.188; MD ₂₋₄ =1.000; MD ₂₋₅ <0.001; MD ₃₋₄ =0.188; MD ₃₋₅ =0.004 MD ₄₋₅ <0.001
2	Productivity	33 (15.8)	82 (39.2)	94 (45.0)	2.29±0.725	0.525		
3	Knowledge	52 (24.9)	81 (38.8)	76 (36.4)	2.11±0.776	0.602		
4	Dependability	44 (21.1)	60 (28.7)	105 (50.2)	2.29±0.794	0.631		
5	Self-initiative	73 (34.9)	95 (45.5)	41 (19.6)	1.85±0.724	0.525		
Job competency group: Work culture								
1	Situation adaptability	41 (19.6)	90 (43.1)	78 (37.3)	2.18±0.735	0.541	F=11.288 P<0.001	MD ₁₋₂ =1.000; MD ₁₋₃ <0.001; MD ₁₋₄ <0.001; MD ₂₋₃ =0.006; MD ₂₋₄ <0.001; MD ₃₋₄ =1.000
2	Programme compliance	41 (19.6)	79 (37.8)	89 (42.6)	2.23±0.756	0.572		
3	Attendance	30 (14.4)	51 (24.4)	128 (61.2)	2.47±0.734	0.539		
4	Punctuality	28 (13.4)	44 (21.1)	137 (65.6)	2.52±0.721	0.520		
Job competency group: Community involvement								
1	Communication	38 (18.2)	68 (32.5)	103 (49.3)	2.31±0.762	0.581	F=6.039 P=0.003	MD ₁₋₂ =0.584 MD ₁₋₃ =0.098 MD ₂₋₃ =0.002
2	Leadership	45 (21.5)	74 (35.4)	90 (43.1)	2.22±0.776	0.602		
3	Community relationship	28 (13.4)	55 (26.3)	126 (60.3)	2.47±0.721	0.519		

Values in parentheses indicate percentage share within the attribute.

Table 2. Correlations with total AHR score (n=97).

Statistic	Service population	Distance from the mother PHC (km)	Years of experience	Age (years)
Mean±SD	1233.51±612.413	11.92±6.226	3.92±0.672	33.87±5.245
Correlation	r _s =0.454	r=-0.131	r=-0.025	r=-0.300 (r ² explains only 9% variability)
P value	<0.001	0.201	0.806	0.003

as estimated by the total AHR score did not change significantly across the subgroups of these indicators (p=0.025 and 0.886, respectively). The number of children the ASHA had, also, did not affect her performance much (p=0.123). Notably, ASHAs hailing from joint families had a higher score of 28.91±6.295 which was significantly

different (p=0.002) from that of ASHAs having a nuclear family. Education had a certain impact in facilitating better performance as mean scores obtained kept increasing with education while variance kept decreasing. Scores of ASHAs not educated beyond middle school differed significantly from that of ASHAs with education up to

education up to intermediate (p=0.030), and graduate and above (p<0.001). A significant difference existed between the means of the total scores obtained by ASHAs from scheduled castes/scheduled tribes and other backward classes (p=0.031). Details have been enumerated in Table 3.

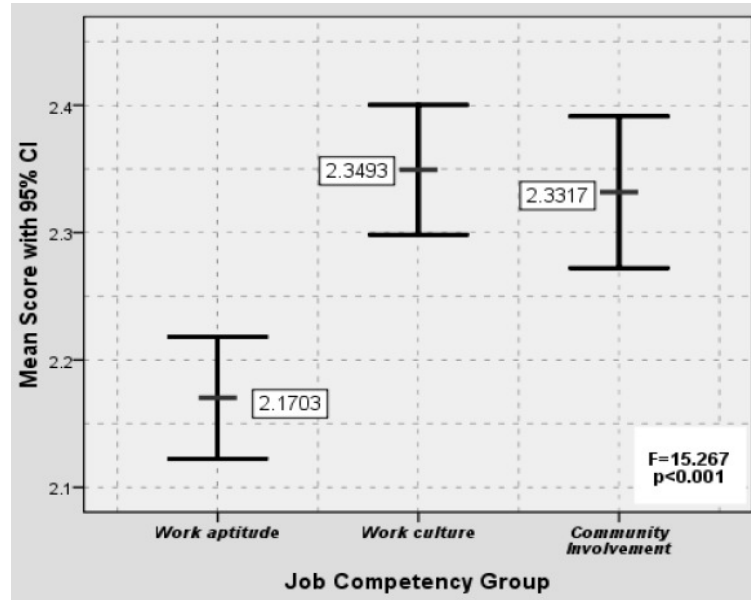


Figure 1. Mean scores of job competency groups with confidence intervals.

Table 3. Comparison of socio-demographic factors of ASHAs with their total AHR score.

Demographic factor	AHR score (Mean±SD)	ANOVA/t-test	P value	Sig. with Bonferroni
Ration card				
1 Red	23.71±7.319	F=1.514	0.225	MD ₁₋₂ =0.821
2 White	26.90±7.636			MD ₁₋₃ =0.293
3 Yellow	28.09±6.199			MD ₂₋₃ =1.000
Type of house				
1 Kutcha	27.56±6.683	F=0.121	0.886	MD ₁₋₂ =1.000
2 Semi-pucca	26.92±7.370			MD ₁₋₃ =1.000
3 Pucca	27.70±6.359			MD ₂₋₃ =1.000
Type of family				
1 Nuclear	24.58±6.433	t=3.136	0.002	--
2 Joint	28.91±6.295			
Family size (number of children)				
1 ≤ 2	28.71±5.932	t=1.556	0.123	--
2 >2	26.62±7.025			
Education (includes current status)				
1 Primary/Middle school	24.04±7.486	F=6.587	<0.001	MD ₁₋₂ =1.000; MD ₁₋₃ =0.030; MD ₁₋₄ <0.001; MD ₂₋₃ =1.000; MD ₂₋₄ =0.059; MD ₃₋₄ =0.209
2 High school	26.23±7.002			
3 Intermediate	28.39±5.545			
4 Graduate/Above	32.25±3.642			
Caste				
1 SC/ST	25.88±6.731	3.127	0.048	#MD ₁₋₂ =0.031
2 OBC	29.44±5.797			#MD ₁₋₃ =0.810
3 Others	26.33±7.126			#MD ₂₋₃ =0.055

*Calculated for each pair using independent samples t-test as post-hoc Bonferroni was not useful.

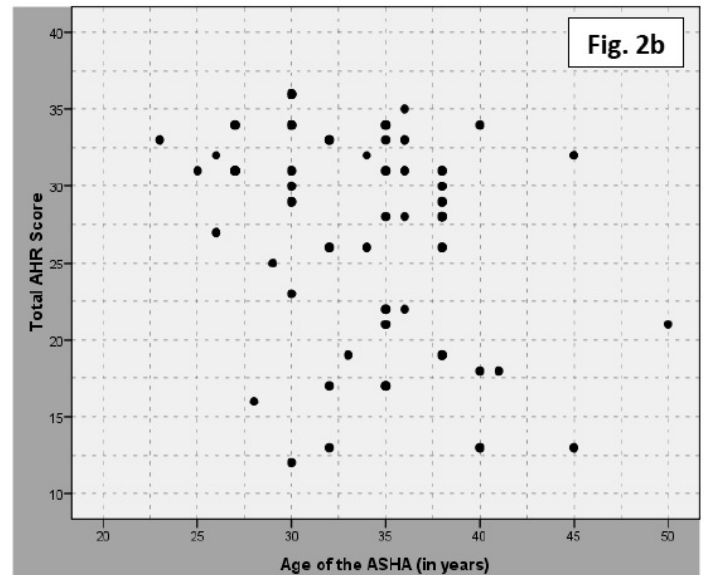
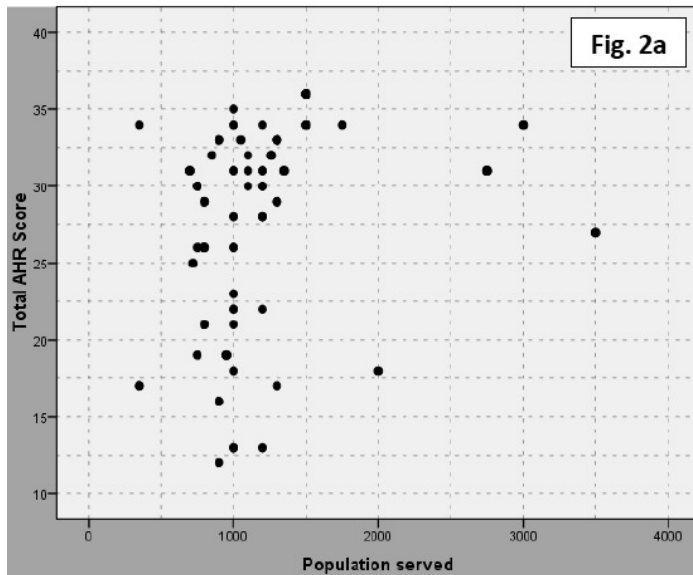


Figure 2. Correlation of (a) population served by ASHA and (b) Age of ASHA, with her total AHR score.

DISCUSSION

The novelty of the concept of ASHA has been seconded by strategic planning for selection, training, incentives and support mechanisms. ASHA is trained to form an interface between the public health care delivery system and the community from where she hails (National Rural Health Mission (NRHM), 2006) and has been the anvil of the NRHM at the village level for most health programmes. As NRHM entered its last year in 2012, the way the ASHA programme has shaped up has been reviewed quite positively by many (NHSRC, 2011; MOHFW, 2010). In these seven years of NRHM, ASHA has had more interaction with ANM than perhaps any other health functionary. An intraorganizational human resource auditing of ASHA by the ANM is promising with scopes to identify existent loopholes. The importance of high quality training, on-the-job support and regular supervision for ASHA has already been reported (NHSRC, 2011; Bajpai and Dholakia, 2011).

The present study reports lack of self-initiation and leadership virtues in ASHA. Given the background of ASHA, a woman from the rurals, it naturally demands enormous extroversion from her to step out of her home, and meet and face the world. This aptly explains why ASHA usually finds herself intimidated in situations that require her active intervention as a leader or decision maker. It is affirmative to find out that ASHA, lacking a self-initiative, plays a subordinate to ANM. This indicates that a hierarchy is maintained where the subordinate waits for the superior's directives instead of working on her own. However, leadership quality is one of the prerequisites for selection as ASHA (NRHM, 2005). The ASHA training modules of NRHM and Comprehensive Child Survival

Programme (CCSP) have taken note of this and hence have laid much stress on role-realization and self-identity of the woman who takes up the role.

On the other hand, programme non-compliance and poor knowledge could be reflective of incompetent and inadequate training; serious brain churning required on this aspect of ASHAs' training as mostly this task is delegated through public private partnership models, quality and uniformity-check of which is very difficult. Mid-term evaluation of NRHM by Earth Institute of Columbia University recommended that ASHAs required proper recruitment, comprehensive training (e.g., full induction on-the-job and regular refresher), effective oversight, and payments that are timely and adequate (Bajpai et al., 2009).

The incentivized jobs of ASHA have been taken up with exemplary interest by her. On the other hand, timely release of incentive has been considered as key link to ASHA's job satisfaction and performance (NHSRC, 2011; Bhatnagar et al., 2009). The inclination towards incentivized job makes ASHA unavailable in her village on many occasions. The need to rush to the PHC at Harahua to facilitate beneficiaries seriously compromises her scope to initiate any other duty on her own or adapt to situational requirements for jobs that do not fetch her incentive. It has been evident in the present study that ASHAs lack situational adaptability and self-initiative.

The welcome finding is ASHAs' attendance and punctuality at her workplace, which the ANMs appreciate the most during routine immunization sessions, mostly. That is also the occasion when the ANM witnesses the ASHA's communication and community relationship. In Harahua, it was found out from the ANM that ASHA was doing fairly well for both attributes. A study from Eastern

Uttar Pradesh showed that even though ASHA is well connected with the society, she needs regular support, training and cooperation from other functionaries (Bajpai and Dholakia, 2011; Srivastava et al., 2009).

The selection of ASHA from the village itself seems to have paid its dividends. The “work culture” and “community involvement” job competency group scored the highest AHR points followed by “work aptitude” in that order. “Work culture” has considered skills that are mostly behavioral and can be inculcated with discipline while “work aptitude” requires the potential for innovation and resilience, which are very difficult to achieve.

The better performance of ASHAs from joint families over those with nuclear family is something to be highlighted. Joint families are likely to give more support in domestic work and this could be allowing ASHA to dedicate more time and attention to her work. The social support system for such ladies should also be higher which reflects in their work.

The study also shows a significant difference between the performance of ASHAs with education less than the requisite minimum for selection (standard 8th) (NRHM, 2005) in comparison to those educated up to intermediate or above. However, this only reinforces the fact that “better the education, better the performance” while simultaneously providing support to the aptness of keeping standard 8th as the criterion minimum. Even if this study suggests no significant difference in the total AHR scores of the ASHAs educated up to middle school and those up to high school, we should be very careful while thinking of raising the selection cut-off lest we repeat what happened in West Bengal when Class X was the notified minimum—unavailability of eligible candidates and under-representation of weaker sections of the society (NHSRC, 2011).

Conclusion

Auditing of human resource is essential to understand the skill inventory. It is pertinent to mention here that ASHAs have been trained by different types of modules and groups. In spite of that, they still lack in knowledge culminating in programme non-compliance, poor self-initiative, situation non-adaptability and absent leadership virtues causing compromised community involvement. The different modules introduced to the ASHAs are mostly forced on them during training, a futile exercise, which is more semantic than strategic. It is recommended that categorical components should be chosen using appropriate adult learning techniques to improve the human resource we have in ASHA.

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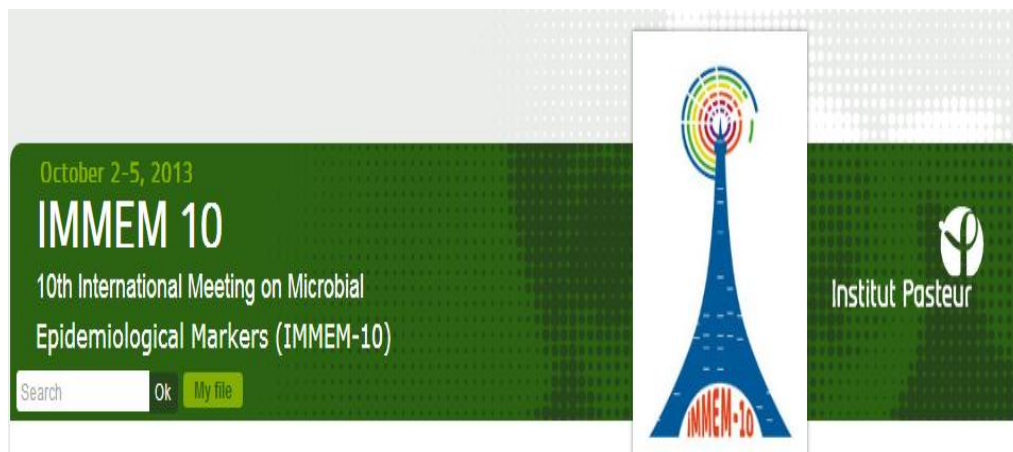
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