

Perinatal Mortality in Viet Nam

*Women should be encouraged to
give birth at health facilities, or have trained
people assisting at delivery*

By Tran Thi Trung Chien,
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The 1999 population and housing census of Viet Nam estimated the population to be 76 million people (CCSC, 1999). According to the 1994 inter-censal survey, the total fertility rate (TFR) was 3.1 children per woman of reproductive age in 1993 (GSO, 1995). The estimate from the 1999 census was 2.3 children per woman in 1999. These estimates suggest that fertility has been falling rapidly in Viet Nam.

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Viet Nam has a fairly well-developed health care system. Although it is one of the world's poorest countries, its incidence of infant mortality is relatively low. The 1997 Viet Nam Demographic and Health Survey found that the infant mortality rate was 44 deaths per thousand live births (in the period 1989-1994), and the estimate from the 1999 census was 37 per thousand in 1999 (NCPFP, 1999). By comparison, the United Nations estimates that the infant mortality rate for countries in the world considered as the "least developed" was 109 deaths per thousand live births in the period 1990-1995 (United Nations, 1997).

The 1997 survey found that in the period 1995-1997 almost three quarters (72 per cent) of pregnant mothers were given some antenatal care, 55 per cent had the recommended two tetanus vaccinations, 62 per cent of women gave birth in a health facility and 89 per cent of births were attended by a professional (NCPFP, 1999).

Steps to improve further the health of mothers and infants would require study of the factors which affect perinatal mortality, and which themselves can be influenced by interventions on the PR of the health authorities. The perinatal period includes the last nine weeks of pregnancy and the first week after birth a miscarriage, stillbirth or death occurring during that period is called "perinatal mortality". The perinatal mortality rate is the best measure of the period during and just after a woman's pregnancy, when the outcome of the pregnancy and the health of the mother and infant are most amenable to such interventions. Perinatal mortality measures the difficulties and complications of pregnancy and delivery, rather than the effects of diseases which kill infants after delivery.

Therefore, in the period 1996-1997, the Ministry of Health undertook a study to measure the levels and determinants of perinatal mortality in seven provinces of Viet Nam; the provinces were chosen to represent the seven major ecological areas of the country. The study was designed to identify the factors underlying patterns of perinatal mortality. This article presents the results of that study and describes the conclusions which policy makers have drawn from it and some of the recommendations they have made based on the findings of the study.¹

Methods

Seven provinces were selected, representing seven different ecological areas of the country:

Province	Ecological area
Yen Bai	Northern uplands

Thai Binh	Red River delta
Ha Tiri	Northern central
Binh Duong	Northern south
Quang Ngai	Southern coastal central
Gia Lai	Central highlands
An Giang	Mekong River delta

In each province, the provincial town and three rural districts were selected. The districts were intentionally selected to represent different ecological areas of the province. A total of 28 districts and towns were selected. In each district, approximately one fifth of the communes were selected, a total of 326 communes.

In each commune, the midwife at the Communal Health Station was trained to record all instances of perinatal mortality and live births. She administered a general questionnaire to each woman for whom a birth was recorded. That questionnaire collected information about the following:

- The respondent's demographic characteristics (age, ethnicity, income, occupation and education of mother, type of residence, that is, mountainous, midlands or plains);
- The respondent's birth history (number of live births, number of dead and living children, number of abortions, miscarriages and previous perinatal deaths);
- The respondent's health (diseases such as tuberculosis and toxemia, and conditions such as previous caesarian deliveries correlated with perinatal mortality);
- The factors relating to her pregnancy (number of doses of tetanus toxoid, whether she took ferrous pills during pregnancy, numbers of pregnancy examinations, qualifications of the person assisting at the birth, location of the place of delivery and distance from the home, conditions of the roads and transportation from the respondent's home to the place of delivery).

For all women for whom an instance of perinatal mortality was recorded, a supervisor administered a separate questionnaire to gather the following information:

- The number of months of pregnancy, the weight of the child, deformities at birth, evidence of asphyxia at birth, whether the infant

began breastfeeding, the duration of labour, the kinds of difficulties the mother may have experienced in labour, the colour of the amniotic fluid, the presentation of the infant or the foetus at birth, evidence of respiratory distress, hypothermia, choking, septicaemia, fever, tetanus and treatment for any of the above;

- Information on the reasons for an instance of perinatal mortality was evaluated by an independent body, the Diagnosis Review Committee, and a determination was made of the causes.

The survey took place during the periods July 1997-June 1998 in the northern provinces and July 1998 - June 1999 in the southern provinces. A team consisting of four doctors supervised the work, including the functions of two local people from the provincial Maternal and Child Health/Family Planning (MCH/FP) Center and outsiders from the Thai Binh Medical College, the organization which conducted the fieldwork. This ensured that the work was conducted objectively, and that local people who knew the area were employed to detect the events.

Each month the midwives sent reports of instances of perinatal mortality to the district supervisors. The district supervisors travelled to the commune to complete the forms on perinatal mortality. District supervisors sent these forms to the provincial supervisors every month. Every two months, the provincial and district supervisors visited the provincial and district hospitals and the local polyclinics to collect data on live births and perinatal mortality in case any details or incidents were missed by the midwives.

In order to ensure that the lists of events were complete, each month the provincial supervisors checked and reviewed the lists of births and instances of perinatal mortality kept by the midwives, and checked these against independent log books kept at the local communal health centres and the family planning/population committees. They also interviewed people from community organizations such as the Communal People's Committee and the Women's Union. Further, they interviewed village leaders and families of dead children to find out if there were any instances of perinatal mortality not on the midwives' lists.

The method of analysis used in this article is to compare the characteristics of instances of perinatal mortality with the live births, according to the socio-economic characteristics of the mothers and the circumstances of the pregnancies and births.

Table 1. Live births and perinatal mortality by province, Viet Nam

Province	Number of births	Perinatal mortality (Number)	Rate per 1,000
Gia Lai	4,653	174	37.4
Yen Bai	3,217	88	27.4
An Giang	4,804	106	22.1
Quang Ngai	3,938	832	1.1
Ha Tinh	4,159	82	19.7
Thai Binh	5,758	102	17.7
Binh Dwmg	5,374	92	17.1
Total	31,903	727	22.8

Results

A total of 32,196 cases were followed up, of which 31,903 were live births. The number of instances of perinatal mortality was 727: 293 before birth and 434 after birth. The perinatal mortality was 23 per thousand.

Two previous studies in Viet Nam reported similar estimates: a study of three districts in Thanh Hoa in 1991² found a rate of 24 per cent and a study of 22 communes in Ho Chi Minh City in 1992 found a rate of 25 per thousand (Nguyen Trong Hieu and Chonsuvivatwong, 1997). The latest estimate by the World Health Organization (WHO, 19%) reported a rate of 25 per thousand.

These rates may be compared with WHO estimates of 53 per thousand for the world, 53 per thousand for Asia, 41 per thousand for East Asia and 37 per thousand for South-East Asia.

Perinatal mortality by province and type of area

Table 1 shows the data by province. Although the overall rate was low, there was considerable variation by province.

The highest rates were in the mountainous provinces of Gia Lai and Yen Bai, where the economy is poor, health care substandard and transportation to health-care facilities difficult. The differential also appears in **table 2**. According to a tabulation not shown, the pregnancies of women living more than 10 kilometres from the place of delivery experienced a perinatal mortality rate of 45 per thousand, but women living less than two km from the place of delivery had a perinatal mortality rate of 14 per thousand. But the difference between urban and rural areas was small.

Table 2. Perinatal mortality rate by type of area, Viet Nam

Type of area	Live births	Perinatal mortality	
		Number	Rate per 1,000
Plains	20,408	384	18.8
Midland/mountainous	11,495	343	29.8
Urban	4,115	83	20.2
Rural	27,788	644	23.2
Total	31,903	727	22.8

Perinatal mortality for the country as a whole

The seven provinces in this study were chosen to represent the seven major regions of Viet Nam. Since the provinces were not chosen randomly, it is not strictly correct to assume that they were representative of the regions from which they were selected. Nonetheless, the Ministry of Health needs the best estimate possible of the perinatal mortality rate at the national level. Therefore, the perinatal mortality rates of each province were weighted by the number of births in each region in 1998. The resulting rate for the country as a whole was 22.2 per thousand, about the same as for the unweighted sample.

Medical causes of perinatal mortality

The causes of perinatal mortality were coded from hospital records and interview forms and in-depth interviews with mothers or relatives. The causes were then cross-checked by supervisors, hospital doctors and the Study Committee before the data-entry process was undertaken.

For each instance of perinatal mortality, the supervisors (in consultation with a hospital doctor) determined the cause of perinatal mortality, according to the International Classification of Diseases (WHO, 1992). The Diagnosis Review Committee reviewed these classifications, and in some cases revised them. **Table 3** shows the data.

Two causes of death preterm births and asphyxia, accounted for 40 per cent of perinatal mortality. The third line in **table 3**, “unidentified foetal deaths”, is a collection of a large number of causes. The third single greatest cause of perinatal mortality was “congenital defects”. The main causes are described below.

Table 3. Percentage distribution of perinatal mortality by medical cause, Viet Nam

Causes	Total	
	Number	Percentage
Preterm births	157	22
Asphyxia	127	18
Unidentified foetal deaths	120	17
Congenital defects	66	9.1
Low birth weight	42	5.8
Malpresentation	39	5.4
Infant pneumonia	28	3.9
Toxemia of pregnancy	26	3.6
Multiple births	22	3
Infant tetanus	16	2.2
Placental praevia	14	1.9
Cord abnormalities	14	1.9
Maternal trauma	13	1.8
Early separation of placenta	7	1
Prolonged gestation	7	1
Unidentified infant deaths	7	1
Haemolytic jaundice	6	0.8
Infections	5	0.7
Murder	3	0.4
Obstetric trauma	3	0.4
Maternal malaria	3	0.4
Uterine rupture	2	0.3
Total	727	100

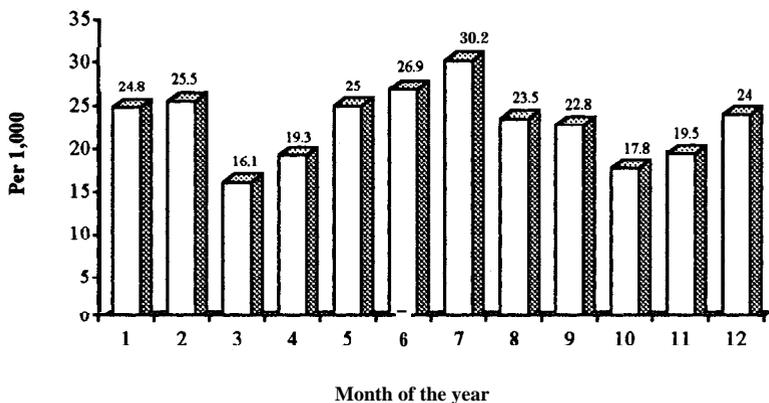
Preterm births

Preterm births are those which occur before 38 weeks of pregnancy have been completed. These are often accompanied by low birth weights and under-developed organs. They often have asphyxia, respiratory distress, infections, anaemia, calcium reduction and other problems, and are likely to die if no appropriate treatment is given. Generally, preterm births relate to the inability of the uterus to retain the foetus, and to artificial interventions or irritations. Preterm births are connected with the physical characteristics of the mother, such as malnutrition and extremely hard work.

Asphyxia

A child is considered to have asphyxia if it cannot breath within one minute after birth Asphyxia may relate to obstructed labour, prolonged

Figure 1: Perinatal mortality rate, by month, Viet Nam



gestation, low birth weight and placental preavia (a condition that can cause haemorrhage). Trained birth attendants can often prevent asphyxia. The highest rate of asphyxia was in Gia Lai and An Giang provinces, where home births unattended by trained personnel were most prevalent.

Congenital defects

Congenital defects accounted for 9.1 per cent of perinatal mortality. These included anencephaly, hydrocephalus, Downs syndrome, shortened limbs, cleft palates, cleft lips, atresia of the oesophagus and absence of genital organs. In general, it is not known what causes such defects. In some cases, early detection might help parents to decide whether to carry the foetus to term.

Factors associated with perinatal mortality

Climate

Perinatal mortality was highest in July, the hottest month in Viet Nam, and also in February, at the end of winter (see [figure 1](#)).

Demographic and physical characteristics of the mother

Table 4 shows that for certain ethnic groups the rate of perinatal mortality was very high. There were also strong correlations by income and education. Low-income women are shorter in height than average, and short women (less than 145 cm tall) had perinatal rates twice the average.

Table 4. Perinatal mortality rate, by demographic characteristics, Viet Nam

Factors	Number of live births	Perinatal mortality rate (per 1000)
Ethnic group		
Kinh (ethnic Vietnamese)	27,041	19.5
others	4,862	24.3
Gia Rai	1,296	32.4
Ba Na	1,040	73.1
Tay	454	39.6
Dao	351	39.9
Hre	340	41.2
Muong	133	52.6
Hmong	102	49.0
others	1,146	20.9
Income		
High	1,047	17.2
Medium	22,939	17.7
LOW	7,917	38.1
Occupation of mothers		
Government employee	2,145	18.6
Farmer	19,676	25.6
Business person	2,479	21.0
Housewife	5,623	16.5
Worker	1,980	19.2
Education		
Illiterate	3,382	41.4
Literate	1,063	31.0
Primary	8,960	24.2
Lower secondary	13,660	19.1
Higher secondary	4,838	15.7

Birth history

Table 5 shows strong relationships between past reproductive events and current ones. In particular, women with one or more miscarriages had much higher probabilities of perinatal mortality. Women with many births and abortions also had higher than normal rates.

Antenatal care and obstetric care

Around two thirds of women received the recommended three antenatal examinations; only around 10 per cent had none. There was a clear relationship between the number of antenatal examinations and the rate of perinatal mortality.

Table 5. Perinatal mortality rate, by the birth history of the mother, Viet Nam

Birth history of the mother	Live births (number)	Perinatal mortality rate (per 1,000)
Number of pregnancies		
More than five	2,178	47.8
Four	2,387	31.4
One	12,977	21.7
Third pregnancy	4,795	21.3
Second pregnancy	9,566	17.2
Menstrual regulation/abortions		
Two or more	349	43
One	1,208	29
Never	30,346	22.3
Miscarriages		
Two or more	216	83.3
One	1,258	55.6
Never	30,429	21
Number of previous cases of perinatal mortality		
Two or more	64	296.9
One	507	163.7
Never	3 1,332	19.9

Ninety per cent of pregnant women received tetanus toxoid injections during pregnancy. The perinatal mortality rate was half for women with the recommended two injections compared with women not having received any injections. This was not due directly to the prevention of tetanus, but was an indirect reflection of the level of antenatal care.

Fifty per cent of women received ferrous pills during pregnancy. Their perinatal mortality rate was half the rate for the women who did not take ferrous pills.

Eighty per cent of births occurred in institutions such as hospitals and commune health centres. In general, the lowest rate of perinatal mortality was in the commune health centres, which took the routine cases; the highest rate was for births at home or in hospitals, which took the most difficult cases. Five per cent of the births took place in private facilities, where the perinatal mortality rate was higher than at the commune health centres. In Viet Nam, private facilities are sometimes run by midwives (or ex-midwives) with insufficient skills or equipment.

A few women gave birth while trying to get to a health facility; their perinatal mortality rate was very high. Where the distance to a place of delivery

was short, the perinatal mortality rate tended to be lower. Bad road conditions and a lack of convenient transport were also connected with high perinatal mortality. Women with no birth attendants at all had the highest perinatal mortality rates.

Discussion

The goal of the Government is to lower perinatal mortality to 18 per thousand by 2010 and to reduce inequalities between areas and ethnic groups. The data presented above suggest that three sets of factors influence perinatal mortality. The first set includes the conditions of life, especially in remote areas, such as low female education, low nutritional intake of the population and the inadequacy of roads. These will gradually be reduced as the country develops economically, as mothers in remote areas get more to eat and as road and transportation systems develop.

The second set of factors has to do with lowering fertility and increasing the use of contraception, since having fewer pregnancies seems to lower perinatal mortality (see **table 5**). This set of factors also depends in part on the economic development of the population, especially in remote areas, but it can be accelerated by giving special attention to increasing female education and providing family planning services, especially in remote and underdeveloped areas.

A third set of factors are those under the control, to some extent, of the health authorities to implement directly. They include the education of the population and of health workers about perinatal mortality, the provision of more and better health centres, especially in remote areas, better training of midwives and health workers, and improvements in ways to detect and refer the most difficult cases in advance of delivery. The following text describes some of the steps which the Ministry of Health believes will lead to a reduction in perinatal mortality, based on the findings of this study.

It is clear from **table 5** that women at high parity and those with certain prior histories are particularly vulnerable to perinatal deaths. There is also evidence that good antenatal care lowers perinatal mortality (**table 6**). Women should be motivated to have pregnancies registered, to have three check-ups and two vaccinations for tetanus prevention, and to take folic acid and ferrous tablets for 90 days during their pregnancy. Service providers should perform the full range of pregnancy check-up procedures: making a general examination and obstetric examination, a urine analysis, giving tetanus vaccinations,

Table 6. Perinatal mortality rate, by place of delivery and kind of birth attendant, Viet Nam

Place of delivery and type of birth attendant	Number of live births	Perinatal mortality rate (per 1000)
Place of delivery		
On the road	2	-a
Forest, fields	1	-a
Provincial/national hospital	6,465	32.3
At home	6,544	31.3
District hospital	5,673	26.6
Other state facilities	244	16.4
Private facilities	1,531	16.3
Polyclinics	1,595	11.9
Communal health stations	9,806	10.1
Birth attendants		
Self-assisted	552	50.7
Relatives	1,305	45.2
Hospital midwives	12,249	30
Traditionat birth attendant	2,848	27.4
Others	1,724	22
Health workers of polyclinics	1,851	12.4
Communal health workers	11,374	11.2

a Because the number of cases is small, the rate may not be statistically significant.

providing folic/ferrous tablets, giving health education, recording and making appointments, informing the woman of the findings and giving instructions on pregnancy care. Women should be encouraged to give birth at health facilities, or have trained people assisting at delivery. For cases of home delivery, where a fiith of births occurred (**table 6**), clean birth sets should be provided.

In order to accomplish this, the number of village health workers who take part in pregnancy management and perinatal care should be increased. Training of traditional birth assistants about clean-birth assistance and safe-birth assistance should be improved. It is necessary to have at least one village health worker per village taking care of pregnancy registration, birth assistance, and making postpartum visits.

About a third of births occurred in communal health centres (**table 6**), but some centres are not properly equipped, particularly with equipment and instruments for emergencies, or pediatric equipment for asphyxia and immature newborns. These facilities should be identified and upgraded, and more mid-wives and nurses hired to work in them.

All communes in the plains and as high a percentage as possible in the highlands should be staffed by a doctor. All communes should have a secondary midwife or an obstetric/paediatric doctor assistant. Medical staff who are well trained on antenatal, perinatal and neonatal health care should serve all villages. As many communes as possible should be provided with equipment for neonatal emergencies; communal health stations should have secondary midwives or obstetric or paediatric assistant doctors; district hospitals should have medical equipment for, low birth weight, premature deliveries and the care of asphyxia neonates. Telephones should be provided at all communal health stations.

Eighteen per cent of births take place in district hospitals. Equipment and training in obstetrics, surgery and paediatrics at all district hospitals should be provided in order to perform essential obstetric and pediatric procedures. There should be a neonatal emergency room set up at all district hospitals, and also a neonatal care department built for newborns and immature neonates, which should be equipped and staffed with specialists and nutritionists in all provincial hospitals.

All provincial hospitals should set up special departments for newborn children. Neonatal intensive care systems at provincial and district levels should be consistently regulated with regard to equipment and staffing.

The Ministry of Health should collect and analyse statistics on the provision of MCH/FP services at the provincial, district and commune levels. Such topics should include the staffing, training of staff and availability of services, by local area. Much of the data can come from currently available management information systems. Based on these data improvements can be prioritized and estimates made of costs. Depending on the funds available, the health network should be strengthened and consolidated, especially in remote areas.

The basic problem of perinatal mortality is that it is highest in the most remote, sparsely populated areas. Lowering perinatal mortality in Viet Nam means reducing the inequalities between the highlands and plains areas. Special attention should be given to inequalities in access and the quality of services.

Cost-benefit analysis should be conducted to determine where best to spend additional funds. The costs of paying for staff, equipment and services should be studied in the context of all primary health programmes. If perinatal mortality is to be lowered in mountainous and remote areas, it will be necessary to find a way of compensating qualified people to live there.

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Endnotes

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2. Ministry of Health, Trial to apply "following card on Mother Health Care at home" in 24 districts, 1991. VIE/88/P15 project, H., 3/1992.

References

- CCSC (Central Census Steering Committee) (2000). *The 1999 Population and Housing Census: Sample* Rest&s (Hanoi, The Gio Publishers).
- GSO (General Statistical *Once*) (1995). *Intercensal Demographic Survey* (Hanoi, Statistical Publishing House).
- NCPFP (National Committee on Population and Family Planning) (1999). *Vietnam Demographic and Health Survey* 1997 (Hanoi, NCPFP).
- Nguyen Trong Hieu and Virasakdi Chongsuvivatwong (1997). "Impact of prenatal care on perinatal mortality", *Southeast Asian Journal of Tropical Medicine and Public Health*, 28(8): 55-61.
- United Nations (1997). *World Population* 1996 (New York, United Nations, Department for Economic and Social Information and Policy Analysis, Population Division).
- WHO (World Health Organization) (1992). *International Classification of Diseases* , Tenth Revision (Geneva, WHO).
- _____ (1996). *Perinatal Mortality: a Listing of Available Information* (Geneva, WHO).

Parental Consanguinity and Offspring Mortality: The Search for Possible Linkage in the Indian Context

*Great care must be taken to be sure that
society understands the issue and voluntarily agrees to
avoid any marriage among biological relatives*

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The main reason for reinvestigating the possible linkage between consanguinity and offspring mortality emerged as a result of the gross disagreement among researchers on this subject. For the purpose of this study,

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consanguinity is defined as marriage between relatives who share at least one common and detectable¹ ancestor. There is no common consensus in the field of human genetics or demographic research regarding the biological impact of parental consanguinity on the health of their offspring. However, in this regard it is possible to recognize three broad schools of thought. Adherents of the first school consider that there is an overwhelming possibility of consanguineous parents having an unhealthy child. According to this school of thought, marriage between close relatives is genetically critical, because closely related individuals have a higher probability of carrying the same alleles² than less closely related individuals. Consequently, an inbred child (the progeny of a consanguineous couple) will more frequently be homozygous³ for various alleles than the offspring of unrelated persons (Whittinghill, 1965). To the extent that homozygosity for genes is deleterious, consanguineous marriage is deleterious (Sutton, 1965). In this respect, the genetic load of deleterious recessive genes, usually known as the lethal equivalent, would cause death if present in homozygous combination (Cavalli-Sforza and Bodmer, 1971). A number of studies on this subject have focused on an increased level of morbidity (Bemiss, 1858; Rao and others, 1977; Ansari and Sinha, 1978) and mortality (Farah and Preston, 1982; Bunday and Alam, 1993; Bittles, 1994) among the offspring of consanguineous parents. Survey results from a few other sources have also identified a linkage between consanguinity and spontaneous abortion (Neel and Schul, 1962; Al-Awadi and others, 1986) and intrauterine loss (Saheb and others, 1981).

Perhaps these observations on genetic complications have encouraged certain states and religious institutions to initiate special marriage laws regarding the permissibility of marriage between biological relatives. For example, in India, according to the Hindu Marriage Act of 1955, marriage between two persons related within five generations on the father's side and three generations on the mother's side is void unless permitted by local custom (Kapadia, 1958). Under the civil statutes of the United States of America, marriage between first cousins has been declared a criminal offence (Ottenheimer, 1990). In many other states, marriage among biological relatives also falls under a ban.

Such prohibitions, according to the view of the second school, however, are based on either biological misconceptions or non-biological grounds. From the genetic point of view, these are meaningless (Stern, 1949; Arora and Sandhu, 1989). In the words of Arora and Sandhu (1989:409):

“Sometimes it is falsely believed that as a result of inbreeding harmful characters appear. No doubt, some harmful characters do

appear during inbreeding, but this will not be in case of heterozygous individuals due to the presence of recessive genes and they will appear only when the individual is homozygous recessive. If the race is free of such recessive genes, there will be no harmful characters”.

The same line of argument has also been raised by Bittles (1994) but for a different reason; he states that, even in the absence of consanguinity, the frequency of alleles can increase owing to the founder effect⁴ and genetic drift.⁵ On the other hand, the complex role of non-genetic determinants of child mortality throws into doubt the validity of the widely accepted positive relationship between consanguinity and offspring mortality. In most cases, it is either very difficult or impossible to classify a death as genetic or non-genetic. Many of the deaths among inbred children may occur because of environmental as well as genetic causes, or interactions between genotypes as well as environmental factors (Cavalli-Sforza and Bodmer, 1971; Bittles, 1994). Another group of studies from different parts of the world have failed to demonstrate as such any positive association between consanguinity and offspring mortality in Brazil (Azevedo and others, 1980), India (Ramkumar and Sood, 1961) and Ireland (Stevenson and Warnock, 1959).

The complex linkage between consanguinity and offspring mortality thus remains at best unclear. A careful tracing back of the histories of different regions and religions may offer enough evidence regarding this ambiguity. For example, the ancient Egyptians and Incas favoured unions between brothers and sisters of the reigning dynasty, because “royal blood” was considered worthy of mixing only with other royal blood (Stern, 1949). By contrast, the Bible forbids marriage between certain classes of relatives. However, in Hindu as well as Islamic religious culture, there is ample evidence of marriage among biological relatives (Kapadia, 1958; Armstrong, 1991). Even in Western societies, some notable personalities, from Charles Darwin to Emma Wedgewood, were married to close relatives (Bittles, 1994). Surprisingly and contrary to the expectation of the first school of thought, no harmful effects were recorded vis-a-vis the offspring from such marriages (Arora and Sandhu, 1989).

According to the third school, however, it is believed that the continued practice of consanguineous marriage over several generations may lead to a narrowing of the differentials in offspring mortality (Bhasin and Nag, 1994; Rao and Inbaraj, 1977). Relatively closed populations that have followed a pattern of close consanguineous marriage for many generations can tolerate quite intensive inbreeding because of the elimination over time of an

X-mutation from that community's gene pool (Bittles and Neel, 1994). It is thus difficult to establish any unique genetic theory on the "inbreeding effect", which really is universal. The role of non-genetic factors has always complicated the endeavour to understand the possible linkage between parental consanguinity and offspring mortality.

Keeping these views in mind this article aims to shed light on two questions: What are the genetic consequences of parental consanguinity, and how is consanguinity likely to affect the scenario of child mortality in India? This study attempts to provide some suitable answers to these questions by exploring the extent of stillbirths, and the neonatal, post-neonatal and child mortality rates among the offspring of consanguineous vis-a-vis non-consanguineous parents, by controlling other important non-genetic proximate determinants of child mortality.

Data and methods

The 1992/93 National Family Health Survey provides an excellent opportunity to undertake this study, because it is a nationally representative probability sample of 88,562 households from 25 states of India that includes 89,777 eligible ever-married women aged 13-49 within these households. Two common questions were asked of all ever-married women in the Survey: "Before you got married, was your husband related to you in any way" and, if the answer to the first question was yes, "what type of relationship was it"? The prevalence and pattern of consanguinity have been estimated from the answers to these two questions. In order to understand more clearly the impact of consanguinity on offspring mortality, the whole consanguineous group has been further divided into two separate categories, close consanguinity and remote consanguinity, according to the relative distance between husband and wife ties. In this regard, only cousin and uncle-niece marriages have been included in the close consanguinity section, because the genetic impact of these marriages is reportedly much more serious than that of remote consanguineous marriage⁶ (Sutton, 1965; Whittinghill, 1965; Bittles, 1994). On the other hand, all eligible women were asked to provide a complete birth history, comprising date of birth, survival status and age of child at death, if applicable. Information on the utilization of antenatal care during pregnancy and delivery assistance from trained professionals was also collected for each child born during the four years prior to the day of the Survey. In this respect, each mother who had a live birth during the previous four years was asked whether she received ferrous tablets or tetanus toxoid injections during her pregnancy (these interventions are usually given during antenatal check-ups). If a woman

had more than one live birth during this four-year period, information was collected for the three most recent live births (IIPS, 1995).

Finally, for a better appraisal of the impact of consanguinity on offspring mortality, multivariate logistic regression models have been 'applied that consider four different indices of mortality, namely, stillbirth⁷, neonatal mortality⁸, post-neonatal mortality⁹ and child mortality¹⁰, as the dependent variables. Except for stillbirth, the three other indices of offspring mortality have been calculated by the conventional method of using live births as the denominator. However, in the case of stillbirths, this study calculated the rate by using eligible women as the denominator. This is appropriate, because at the aggregate level, it represents the proportion of women who had a stillbirth because of consanguinity. At the individual level (for the multivariate analysis), it is a dichotomous variable indicating whether or not a woman had a stillbirth. In the Survey, in addition to birth histories, information on stillbirths was collected from each eligible woman in terms of whether she had a stillbirth, and, if so, the number of such events.

Prevalence of consanguinity

Global context

In spite of the widespread detrimental impressions about inbreeding, marriage among relatives is still quite common in various parts of the world, especially in Asia and Africa. Besides India, in the ESCAP region, the prevalence of marriage among biological relatives is still high in Pakistan (Maian and Mushtaq, 1994; Bittles, 1994), Uzbekistan (Ginter and others, 1980) and the Islamic Republic of Iran (Naderi, 1979). If the African countries, where the practice is common, are included, it can be seen that a wide spectrum of Muslim countries show a strong preference for consanguineous marriage. Parallel first-cousin marriage (for example, between the son of a woman's brother and her daughter) is the most common type of union in this regard (Bittles, 1994).

Indian context

The Indian subcontinent is a panorama of diversity in terms of culture, caste, religion, beliefs and attitudes towards customary social practices. A reflection of this diversity can be seen in the preference for consanguineous marriage. **Table 1** shows the regional variations in the prevalence of consanguinity in India. According to this table, one out of every six (16 per cent) marriages in India is among biological relatives. The prevalence of such

Table 1. Percentage distribution of ever-married women, aged 13-49 years, by region, according to their marriage pattern, India, 1992-1993

Regions of India	Close consanguineous marriage ^f	Remote consanguineous marriage ^g	Non-consanguineous marriage	Total number of ever-married women
East and North-East ^a	4.7	3.0	92.3	23,275
North ^b	1.7	3.9	94.4	10,630
Central ^c	6.4	2.7	90.9	22,010
West ^d	15.5	5.3	79.2	12,985
South ^e	29.2	6.9	63.9	20,877
All India	12.0	4.3	83.7	89,777

^a East and North-East comprises West Bengal, Bihar, Orissa, Assam, Tripura, Arunachal Pradesh, Manipur, Nagaland and Mizoram, and Maghalaya.

^b North comprises Himachal Pradesh, Jammu and Kashmir, Delhi, Rajasthan, Punjab and Haryana.

^c Central comprises Uttar Pradesh and Madhya Pradesh.

^d West comprises Maharashtra, Gujarat and Goa.

^e South comprises Tamil Nadu, Andhra Pradesh, Karnataka and Kerala.

^f Close consanguineous marriage includes marriage among cousins, and among uncles and nieces.

^g Remote consanguineous marriage includes marriage with brother-in-law and other relatives.

marriages, however, is not uniformly distributed, varying from a very low level of 6 per cent in the northern region of the country to 36 per cent in the southern region; the level is 19 per cent in the western region and 9 per cent in the central region. Even in the southern region, wide variations can be seen among the States of Kerala, Tamil Nadu, Andhra Pradesh and Kamataka. The frequency of consanguinity varies from 52 per cent in Tamil Nadu and approximately 37 per cent in Andhra Pradesh and Kamataka to only 11 per cent in Kerala (Banerjee and Roy, 1996). The relatively high level of consanguinity in the southern region has often been interpreted as a practice of Dravidian people (Bittles and others, 1985). In the southern region, Hindus have a stronger affinity for consanguineous marriage than Muslims (Banerjee and Roy, 1996; Bittles and others, 1987).

In the western region, marriage among biological relatives has been found to be fairly common in Maharashtra (20 per cent) followed by Goa (15 per cent) and Gujarat (7 per cent). Although consanguineous marriage in this region of the country is fairly common among all religious communities,

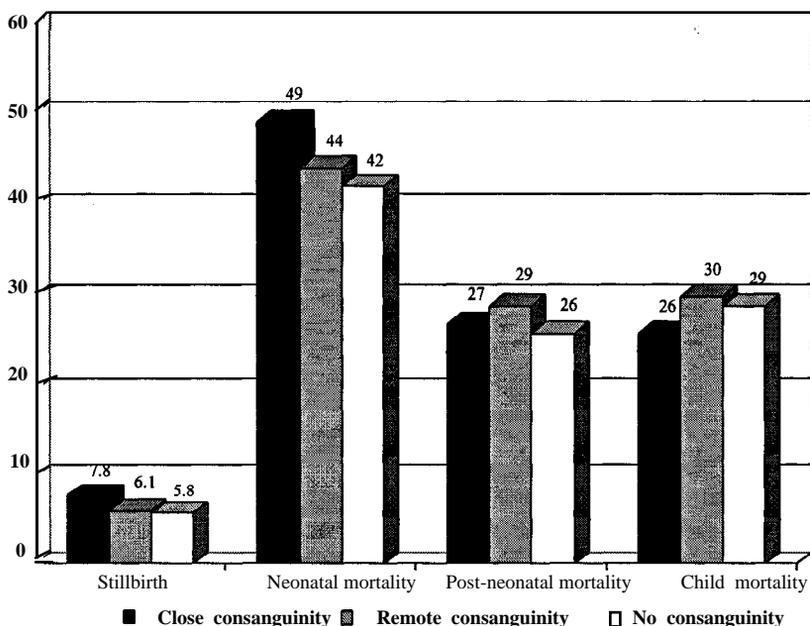
namely Muslims, Hindus, Parses and Christians (Bhasin and Nag, 1994), the strongest preference for consanguinity is seen among Muslims (Banerjee and Roy, 1996). The prevalence rates for the remaining regions, namely the northern, central, eastern and northeastern parts of the country, are low and basically found among Muslims and some minority communities.

With regard to the type of consanguinity, close consanguinity is quite frequent in all regions as compared with remote consanguinity. For example, 29 per cent of all marriages in South India have been recorded as close consanguineous marriages compared with only 7 per cent being remote consanguineous marriages. In this respect, marriage between first cousins (mostly between cross cousins and occasionally between parallel cousins) is much more common than uncle-niece and second cousin marriages. However, in earlier times, the preferred consanguineous marriage for a man was his sister's daughter (Dronamrayu and Khan, 1960). But in recent times, the incidence of uncle-niece marriage has declined, mainly because of the shortage of suitable nieces of marriageable age for an uncle to choose from. When fertility was high and the age at marriage low, each woman had many children, and it was considered appropriate for a woman's eldest daughter's daughter to marry her mother's younger brother (Richard and Rao, 1994). As a result of this situation, even though it is allowed by custom, all other remaining states, except for Tamil Nadu, have a very low frequency of uncle-niece marriage.

Consanguinity and offspring mortality

Until the recent past, there has been no consensus in the literature regarding the genetic impact of inbreeding on offspring mortality. The overwhelming majority of research in the fields of human genetics, medical biology and demography has consistently shown elevated mortality rates among the offspring of consanguineous parents from different parts of world: from Brazil (Azevedo and others, 1980), Egypt (Hussein, 1971), France (United Nations, 1962), India (Centerwall and Centerwall, 1966; Padmadas and Nair, 2001), Japan (United Nations, 1962), Pakistan (Bittles, 1994) Sudan (Ahmed, 1979; Farah and Preston, 1982), Sweden (Book, 1957), United Kingdom of Great Britain and Northern Ireland (Bunday and Alam, 1993) and United States (Bemiss, 1858; United Nations, 1962). None of these studies is, however, comparable. They vary in their methodological rigour; different researchers have utilized different types of data (hospital-based data, localized data, large-scale sample survey data or census data) as well as different statistical techniques (with or without controls). Although they have come to more or less same conclusion, the crucial questions of validity and reliability need to be examined carefully.

Figure 1. Consanguinity and offspring mortality, India



Note: The neonatal, post-neonatal and child mortality rates have been calculated per thousand live births, whereas stillbirth has been estimated per thousand eligible women.

Figure 1 exhibits the survival status of births to consanguineous couples in India by four indices, namely, stillbirths, neonatal mortality, post-neonatal mortality and child mortality, according to the degree of consanguinity. Differentials in terms of stillbirths as well as neonatal mortality show a clear association between mortality and the degree of consanguinity.

As expected, stillbirths are highest among mothers in close consanguineous marriages (7.8 per thousand women) followed by mothers in remote consanguineous marriages (6.1 per thousand women) and mothers in non-consanguineous marriages (5.8 per thousand women). The same differentials can also be seen in the case of neonatal mortality. The mortality rate increased from 42 per thousand live births among the offspring of non-consanguineous parents to 44 per thousand among the offspring of remote consanguineous parents and 49 per thousand among the progeny of close

consanguineous parents. However, the same differences are not observed with regard to post-neonatal and child mortality; the offspring of remote consanguineous parents have slightly higher mortality rates than the offspring of close and non-consanguineous parents.

Do these factors really imply that the genetic impact of inbreeding is more deleterious during the prenatal phase or in the early postnatal period (first 30 days of life)? It is really very difficult to provide a suitable answer to this question with confidence, based on the crude results shown in **figure 1**, particularly in the case of developing countries such as India where a huge number of newborn babies die because of environmental conditions, disease, malnutrition and especially poorly managed pregnancies, deliveries and postnatal care (Banerjee and Roy, 1997). A large proportion of deliveries among illiterate mothers, mostly from rural areas, are still being performed in an unhygienic room with the help of a traditional birth attendant who customarily uses a non-sterilized razor blade or a sharp piece of bamboo in order to cut the umbilical cord. As a consequence, a large number of newborns have been observed to die from infectious diseases (CBHI, 1991; Banerjee and Roy, 1997). For example, over 55 per cent of the total number of infant deaths in India have been reported as due to prematurity, birth injury and cord infections (CBHI, 1991). Under circumstances where a set of complex non-genetic factors also play a crucial role in influencing the survival status of the offspring, it is very difficult to classify a death as genetic or non-genetic without proper control of all possible non-genetic proximate determinants of child mortality. This would be clear from a study in Sudan where the investigators found 20 per cent higher rates of child mortality among consanguineous parents:

“There may, of course, be genetic reasons for higher mortality among offspring of close kin The effect is by no means inconsequential, . . . it requires about six additional years of education for a woman (or ten for a man) to offset the child-survival consequences of marrying a cousin” (Farah and Preston, 1982:378).

An important problem in the study of consanguinity is, therefore, the choice of non-genetic controls. Keeping this issue in mind, this article includes a set of social, economic and biological determinants of child mortality (as control variables), which necessarily operate through a common set of proximate determinants to exert an impact on child mortality (Mosley and Chen, 1984).

Non-genetic determinants of offspring mortality

Mother's education

Maternal education has always been regarded as the best “immunization” against child mortality, because it is associated with better personal hygiene, greater use of available health services and better child-care practices. The present study provides sufficient evidence in favour of this hypothesis (**table 2**). Irrespective of the degree of parental consanguinity, education infers a clear negative association with offspring mortality. For example, even among consanguineous parents, the rate of neonatal mortality in the case of illiterate mothers is 61 per cent higher than among mothers who are highly educated (those who have completed 10 years of schooling). The same trend in mortality differentials can also be observed in the case of remote consanguineous and non-consanguineous mothers. Although this may be true for any indices of offspring mortality, the most interesting point is that, if we control the level of maternal education, the degree of parental consanguinity will infer a positive association with offspring mortality. In this regard, mortality differentials are more pronounced among educated mothers. In the case of highly educated mothers, neonatal mortality among the close consanguineous group is 57 per cent and 43 per cent higher than among remote and non-consanguineous groups respectively. In the case of illiterate mothers, although the general level of mortality is quite high, the close consanguineous group had only an 8 per cent higher rate of mortality than the non-consanguineous group with regard to stillbirths. The close consanguineous group had higher rates of foetal loss compared with the remote and non-consanguineous groups. As for post-neonatal mortality, the remote consanguineous group experienced higher rates of mortality when the mothers were either illiterate or literate up to the middle standard, whereas the close consanguineous group had substantially higher mortality when the mothers were highly educated. However, the role of parental consanguinity with respect to mother's education is quite inconclusive in terms of child mortality.

Standard of living

Living standards, especially the physical environment at home, water supply, sanitation facilities and cooking arrangements comprise the single most important factor influencing child survival. In one way, living standards directly influence the child's risk of exposure to infectious diseases (Behm, 1991) through contamination of the household environment. In another, they indirectly influence nutritional intake and personal hygiene, and especially the

Table 2. Stillbirths, neonatal, post-neonatal and child mortality in India, by marriage type and selected background characteristics

Background characteristics	Stillbirth ^a			Neonatal mortality			Post-neonatal mortality			Child mortality ^a		
	CC ^b	RC ^c	NC ^d	CC ^b	RC ^c	NC ^d	CC ^b	RC ^c	NC ^d	CC ^b	RC ^c	NC ^d
Education												
Illiterate	8.6	7.5	6.9	53	55	49	31	37	32	31	40	38
Literate up to middle school	6.4	4.8	4.6	44	30	32	20	22	19	18	17	15
Educated (10+ years)	4.6	2.4	2.7	33	21	23	16	6	9	5	6	5
Standard of living												
Low	8.6	6.8	6.6	56	56	51	35	41	33	33	42	42
Medium	7.3	5.9	5.7	42	40	37	18	27	22	22	27	21
High	5.0	4.8	3.6	37	22	23	19	10	11	4	6	7
Birth spacing (months)												
24 or more	--	--	--	39	38	35	21	19	20	26	30	27
< 24	--	--	--	88	68	67	50	68	47	28	31	36
Mother's age (years)												
< 20	--	--	--	62	70	63	33	29	32	26	29	32
20-29	--	--	--	41	38	36	25	27	24	27	32	28
30 or more	--	--	--	84	50	40	31	56	35	19	16	34
Antenatal care												
Received	--	--	--	38	27	27	19	13	16	--	--	--
Not received	--	--	--	62	61	53	37	45	34	--	--	--
Delivery care												
Home delivery without trained health professional (including doctor and nurse)	--	--	--	50	47	44	29	34	31	--	--	--
Home delivery with trained health professional (including doctor and nurse)	--	--	--	53	38	29	32	17	20	--	--	--
Institutional delivery	--	--	--	46	40	40	23	23	16	--	--	--

Note: The neonatal, post-neonatal and child mortality rates have been calculated per thousand live births, whereas stillbirths have been estimated per thousand eligible women.

a Data were not included in the cells with a dash.

b Close consanguineous marriage.

c Remote consanguineous marriage.

d Non-consanguineous marriage.

household's capacity to purchase health services (Banerjee and Roy, 1997). In this context, household living standards are estimated here by stratifying all households into three categories (high, medium and low) on the basis of quality of housing, availability of electricity, sources of drinking water, nature of toilet facilities and possession of consumer durable goods.¹¹ Thus, a high living standard implies not only a higher economic status but also a favourable disposition towards a better quality of life (Roy and others, 1999). **Table 2** exhibits the expected negative association between living standards and mortality among offspring. Cross analysis of mortality indices by living standard reflects a clear positive association with the degree of consanguinity, that is, the closer the degree of parental consanguinity, the higher is the incidence of offspring mortality. For example, in the case of mothers who have a high standard of living, the rates of neonatal mortality among those in the close consanguineous group are higher by 68 per cent and 61 per cent respectively than in the remote consanguineous and non-consanguineous groups. The same trend in mortality differentials, although to a lesser extent, can be seen among mothers who have a low standard of living. Parental consanguinity plays no role in influencing child mortality.

Biological risk factors

In terms of child survival, the biological risk faced by a mother has always been determined according to her age at the time she gives birth, the interval between two successive births and the order of birth. A very young age at the time she gives birth reflects maternal immaturity, whereas giving birth at an older age increases the likelihood of birth defects (DaVanzo, 1984). In this respect, mothers who have given birth either before the age of 18 years or at 30 years or more are identified as biologically risky mothers. Further, a short interval between two successive births would affect the survival prospects of the newborns either because of nutritional depletion and lack of gestational maturity on the part of the mother which results in low birth weight babies, or because of competition among children for the mother's attention (DaVanzo, 1984). Available research in this direction has also shown that children are at an increased risk of mortality if the interval between births is less than 24 months (Hobcraft and others, 1983). Considering this point, all births have been stratified here into two categories on the basis of the interval between two births: a short birth interval being an interval of fewer than 24 months and a lengthy birth interval being an interval of 24 or more months. The impact of these risk factors is also covered in the present study. **Table 2** shows elevated rates of mortality with respect to birth intervals and mother's age at the time

she gives birth. For example, in the case of consanguineous mothers, the post-neonatal mortality rate among babies characterized by a short birth interval is 138 per cent higher than among births separated by 24 or more months. However, irrespective of the birth interval (with or without risk), neonatal and post-neonatal mortality is highest in the close consanguineous group. As for long birth intervals, the rate of neonatal mortality in the close consanguineous group is 11 per cent higher than among the non-consanguineous groups, whereas in case of a short birth interval, the gap further increases to 31 per cent. Although the rate of neonatal mortality by mother's age at the time she gives birth exhibits no difference between the close consanguineous and remote consanguineous groups in the case of very young mothers (under 20 years of age), the difference is very high in the case of mothers who have given birth at 30 years of age or older.

Prenatal care

The lack of scientific care for foetuses and unborn babies has the greatest influence on the health of the newborn. It can be observed from the present study that the care of the mother during pregnancy (antenatal care) and delivery (assistance from a trained health professional) has a substantial impact on pregnancy outcome (**table 2**). Irrespective of parental consanguinity, the rates of neonatal mortality are quite high among mothers who did not receive any antenatal care. However, it is interesting to note that, even if mothers have received antenatal care, the neonatal mortality rate among those in the close consanguineous group is approximately 41 per cent higher than among the remote and non-consanguineous groups; the same is also true in terms of delivery assistance.

Thus, a bivariate control of any proximate determinant of offspring mortality infers an elevated risk of mortality (particularly in the very early phase of infancy) among the offspring of consanguineous parents. The extent of risk, however, varies in degree from a close consanguineous mother at one end of the spectrum to a remote and non-consanguineous mother at the other end; likewise, it varies from an educated mother who most likely has received antenatal care to an illiterate mother who has not received any antenatal care. However, the failure to control simultaneously for all selected proximate determinants may be the root of a superfluous variation in searching the possible linkages between parental consanguinity and offspring mortality. Keeping this view in mind, multivariate analyses have been undertaken in order to assess the impact of parental consanguinity on mortality after controlling the role of all other selected proximate determinants of offspring mortality.

Multivariate analyses for offspring mortality

Four different logistic regression models have been used with respect to the four different indices of offspring mortality as dependent variables. Model I considers stillbirths, whereas models II, III and IV are assigned to neonatal mortality, post-neonatal mortality and child mortality respectively.¹² The regression coefficients of the selected variables represent the amount by which the odds of mortality for a specific category vary from that of the reference category, once the effects of all other variables in the model have been controlled. For each model, two separate regression equations have been estimated. In the first step, only parental consanguinity has been included as an explanatory variable in each model; in the second step, with consanguinity following selected proximate determinants of offspring mortality, place of residence, religion, caste, maternal education, living standard, region, birth order, birth interval, utilization of antenatal care services, assistance during delivery and mother's age at the time she gave birth have been added. The logic behind this is to see how the impact of consanguinity on offspring mortality changes once other variables, which are expected to have an impact on different indices of mortality, are controlled statistically.

Findings of the regression analyses (**table 3**) disclose that in regressions limited to the consanguinity variable only, close consanguinity has a significant positive effect on stillbirths (model I) and neonatal mortality (model II), while remote consanguinity as such has no significant effect on any of the indices of offspring mortality. However, in contrast to the bivariate analysis, close consanguinity has a negative (although insignificant) effect on post-neonatal mortality (model III). Concerning model IV, close consanguinity again reveals a strong and significant negative effect on child mortality, which implies a considerably lower risk of child mortality among the consanguineous group with respect to the reference category, that is, the non-consanguineous group. Some interesting changes in the relationship between consanguinity and offspring mortality can be observed in two regression equations (with and without controls) in models II to IV. In model II, once all the proximate determinants are included in the regression, the relationship between close consanguinity and neonatal mortality becomes even stronger. For post-neonatal mortality (model III), the change is more conspicuous; the regression coefficient of close consanguinity changes from negative and insignificant to positive and significant. For example, the odds of post-neonatal mortality (the ratio of children dying during the post-neonatal period to those who survive) after control is 27 per cent higher among the close consanguineous couples

than non-consanguineous couples. Because the utilization of antenatal care, which is found to have a strong influence on lowering the mortality levels, is much higher among close consanguineous mothers compared with non-consanguineous mothers¹³, the effect of consanguinity changes after control. In model IV, close consanguinity has lost its strong and significant negative effect on child mortality, once the effects of all other variables are controlled. It is unlikely that other mortality indices of consanguinity have any influence as such on child mortality.

Table 3 also shows few interactions having a significant influence on mortality. Although the effects of many more interactions have been investigated, since they did not show any significant influence, they were excluded from the models. It is worth mentioning that there is no significant interaction between consanguinity and region or religion on offspring mortality. In other words, the higher incidence of offspring mortality (both neonatal and post-neonatal) among close consanguineous couples was uniformly evident in all regions and among all religious groups. The influence of all other proximate determinants on the mortality levels was found to be in the expected direction. The only exception is the effect of delivery care. It may appear surprising to find that births occurring in an institution such as a hospital or clinic had higher odds of mortality compared with those delivered at home and without the help of any health professional. Does this really imply a higher risk of mortality in institutional delivery? Certainly not, particularly in a country such as India, where only 16 per cent of total deliveries in rural areas are performed in an institutional setting. In this regard, mothers from the rural areas have been observed as seeking institutional delivery if and only if they face a complication at the time of delivery. Naturally, in helpless situations, doctors are not always successful in saving the life of a newborn baby (Banerjee and Roy, 1997). That is why the incidence of mortality in cases of institutional delivery is higher than the reference category.

Conclusions

There is still some preference for marriage among biological relatives in India, particularly in the southern and western parts of the country. Close consanguineous marriage occurs quite frequently and it has a crucial genetic effect on offspring mortality. It is quite clear from the bivariate as well as multivariate analyses, however, that the genetic effect of consanguinity on offspring mortality is detrimental only among close consanguineous couples and exclusively during the period of development of the foetus (stillbirths) and

Table 3. Results of logistic regression analysis for stillbirth, neonatal, post-neonatal and child mortality, India

Variables	Reference category	Model I - stillbirth (Na= 89,777)		Model II - neonatal mortality (N=48,412)		Model III - post-neonatal mortality (N=36,318)		Model IV - child mortality (N=79,362)									
		β	EXP (β)	β	EXP (β)	β	EXP (β)	β	EXP (β)								
Consanguinity																	
Close consanguinity	Non-	.306 ^b	1.4	.345 ^b	1.4	0.131 ^c	1.14	0.219 ^b	1.3	-0.17	0.98	0.240 ^c	1.27	-199 ^b	0.82	-0.15	0.98
Remote consanguinity	consanguinity	.056	1.1	.103	1.1	0.153	1.17	0.148	1.2	0.083	1.08	0.274	1.32	-1.23	0.88	0.038	1.03
Place of residence																	
Urban	Rural			.015	1.0			-.223 ^b	0.80			-0.063	0.94			-.102	0.90
Religion																	
Muslim	Hindu			.147 ^b	1.2			-.140 ^c	0.87			-.101	0.90			-.095	0.91
Other				0.91	1.1			-.213	0.81			0.437 ^c	0.64			-.140	0.87
Caste																	
other caste	Scheduled caste and scheduled tribe			-.025	0.98			-.051	0.95			-.056	0.95			0.196 ^b	0.82
Education																	
Literate up to middle School	Illiterate			.329 ^b	0.72			-.130	0.88			-.122	0.89			-.406 ^b	0.67
Highly educated				-.783 ^b	0.45			-.007	0.99			0.125	1.13			-1.03 ^b	0.36
Standard of living																	
Medium	Low standard of living			-.056	0.95			-.209 ^b	0.63			-.308 ^b	0.73			-.456 ^b	0.63
High				-.116	0.88			-.461 ^b	0.81			-.616	0.54			-1.167 ^b	0.31
Region																	
East	South			.185 ^b	1.2			0.090	1.09			0.273 ^c	1.31			0.335 ^b	1.39
North				.287 ^b	1.3			-.215 ^c	0.80			0.426 ^b	1.53			0.252 ^b	1.28
Central				.037	1.0			0.154	1.16			0.332 ^b	1.39			0.655 ^b	1.93
West				-.242 ^b	0.78			-.103	0.90			0.314 ^c	0.73			0.101	1.10
Birth order																	
Older 1	Birth order			^d	^d			1.001 ^b	2.72			0.788 ^b	2.19			-.281 ^b	0.75
Order 4 and above	and 3			^d	^d			0.076	1.07			0.177 ^c	1.19			0.098 ^c	1.10

Birth interval											
<24 months	24 months and above	d	d	1.151 ^{b}	3.16	1.150 ^{b}	3.16	d	d		
Antenatal care											
Received antenatal care	No antenatal care	d	d	-.497 ^{b}	0.61	0.402 ^{b}	0.67	d	d		
Delivery care											
At home with health professional	At home with no health professional	d	d	-.423 ^{b}	0.65	-.521 ^{b}	0.59	d	d		
Institutional		d	d	0.831 ^{b}	2.29	0.441 ^{b}	1.56	d	d		
Mother's age (years)											
<20	20-29	d	d	0.204 ^{b}	1.23	0.067	1.07	0.188 ^{b}	1.21		
>30		d	d	0.236 ^{c}	1.27	0.483 ^{b}	1.62	-.150	0.86		
Interaction											
Antenatal care - institutional delivery		----	----	-.365 ^{b}	0.69	-.376 ^{c}	0.68	----	----		
Birth order 1 -institutional delivery		----	----	-.283 ^{b}	0.75	-.539 ^{b}	0.58	----	----		
Antenatal care - home delivery but assisted by a health professional		----	----	0.598 ^{b}	1.82	0.406	1.50	----	----		
Literate up to middle school - institutional delivery		----	----	-.36g ^{b}	0.69	-.024	0.98	----	----		
Highly educated 10-year - institutional delivery		----	----	-.710 ^{b}	0.49	-.893 ^{c}	0.41	----	----		
Central zone - institutional delivery		----	----	0.346 ^{b}	1.41	0.060	1.06	----	----		
Northern Zone - institutional delivery		----	----	0.445 ^{b}	1.56	0.428	1.53	----	----		
Constant				-2.79	-2.65	-3.04	-3.44	-3.690	-4.074	-3.415	-3.358

- a** Total number of samples
- b** p< .01
- c** p< .05
- d** not included in the model

the early phase of infancy (neonatal and postnatal periods). Thus, unless genetic impacts are operative in the very early phase of conception, consanguinity seems to have as such no adverse effect on offspring mortality.

Hence, the findings of this study are likely to attract serious attention from policy makers in Government, and social and religious institutes. The question that arises in the current scenario is how to deal with the long-standing cultural practices of consanguinity, which may have detrimental impacts on the health of children. Banning of marriage among biological relatives by law is not the ultimate solution. Before enacting a ban, great care must be taken to be sure that society understands the issue and voluntarily agrees to avoid any marriage among biological relatives. To ensure this, a comprehensive and mutually consistent IEC (information, education and communication) programme is needed on these matters along with other important issues associated with reproductive health and sexually transmitted infections. Such a programme certainly should have enough strength to dilute the cultural taboos linked with these social practices.

Endnotes

1. Human beings are all remotely related. The population of the world is not large enough to provide ancestors for each of our 2^n bearers of chromosomes, where "n" is the number of generations. Thus, some persons served as ancestors through more than one line of descent. Such remote consanguinity is of little genetic interest.
2. An allele is one of two genes, found on a chromosome, that causes specific characteristics, such as eye colour.
3. Individuals who carry two genes of the same type, such as AA or A / A' are said to be homozygotes, meaning that as zygotes they were formed by the union of "same" gametes. Otherwise, individuals who carry a pair of different genes such as AA' are called heterozygotes.
4. Gene frequency in a population which can be traced back to one of the founders is regarded as the "founder effect"
5. Genetic drift is the random fluctuation of gene frequencies in a population of finite size.
6. For any given gene frequency, marriage among close relatives produces a specific additional chance of having offspring homozygous for a rare recessive allele in comparison to random matings. For example, at gene frequency $q = 0.01$ cousin marriage contributes recessive genes at a frequency over seven times higher than that of a random marriage. The lower the value of "q", the higher is the risk from consanguinity (see Whittinghill, 1965: 125).
7. Birth of a dead child, who did not show any signs of life by crying, breathing or moving, is considered a stillbirth. The relevant index was calculated as the proportion of eligible women ever having a stillbirth.
8. The neonatal index is the proportion of babies who died in the first month of life; it was calculated from the records of birth history (for the four-year period preceding the Survey) considering all births aged 30 days and above as the denominator.

9. The post-neonatal index is the proportion of babies who died within 1-11 months of life; it was calculated from the records of birth history (for the four-year period preceding the Survey) considering all births aged 12 months and above as the denominator.

10. The child mortality index is the proportion of babies who died between their first and fifth birthday; it was calculated from the records of birth history, considering all births aged five years and above as the denominator.

11. In order to understand the socio-economic status of the household, a standard of living index was estimated on the basis of possession of the following variables: (a) separate room for cooking, (b) type of house, (c) source of lighting, (d) fuel for cooking, (e) source of drinking water, (f) type of toilet facility, (g) ownership of livestock, (h) ownership of goods such as sewing machine, sofa, fan, radio, bicycle, clock, watch, refrigerator, television, video tape recorder, mortar cycle and car.

12. In model I, the dependent variable is whether or not a woman had a stillbirth at any time in her reproductive life. The analysis is based on each individual woman's file. The unit of analysis in the remaining three models are births occurring to women in different periods prior to the Survey. The dependent variables in these models are whether a child who had been born died during the neonatal, post-neonatal and childhood (1-4 years) periods respectively. For model II, all births occurring during 1 to 47 months are considered. Model III considers all births occurring during 12-47 months prior to the Survey and the last model takes into account births occurring beyond five years prior to the Survey. The information on antenatal and natal care services are available only for births during the previous four years. Because they are important determinants of neonatal and post-neonatal mortality, the analyses of model II and III are restricted to births during the period four years before the Survey.

13. Around 55 per cent of close consanguineous mothers are estimated to have received antenatal care services compared with 44 per cent in the case of non-consanguineous mothers.

References

- Ahmed, A.H. (1979). "Consanguinity schizophrenia in Sudan", *British Journal of Psychiatry*, 134:635-636.
- Al-Awadi, S.A., K.K. Naguib, M.A. Moussa, T.I. Farag, AS. Teebi and M.Y. FI-Khalifa (1986). "The effect of consanguineous marriages on reproductive wastage", *Clinical Genetics*, 29:384-388.
- Ansari, N.A. and S.P. Sinha (1978). "Survey on the effects of inbreeding in two populations of Bihar", *Indian Journal of Medical Research* 68:295-299.
- Armstrong, K. (1991). *Muhammad: A Western Attempt to Understand Islam* (London, Gollancz).
- Arora, M.P. and G.S. Sandhu (1989). *Genetics*, (Bombay, Himalaya Publishing House), pp 408-419.
- Azevedo, E.S., N. Freire-maia, C.C. Azevedo Maria, T.A. Weimer and M.M. Souza Monica (1980). "Inbreeding in a Brazilian general hospital", *Annals of Human Genetics* 43:255-264.
- Banerjee, Sushanta K. and T.K. Roy (1996). "Incidence of consanguineous marriage in India and its impact on child health and reproductive complication", paper presented at 19th Congress of the Indian Association for the Study of Population, Baroda, India, 25-27 February.

- _____ (1997). "Newborn care for the Indian mother: evidences from National Family Health Survey", *The Newborn*, 3:9-14.
- Behm, H. (1991). "An analytical framework", in *Child Mortality in Developing Countries: Socio-economic Differentials, Trends and Implications* (New York, United Nations Department of International Economic and Social Affairs).
- Bemiss, S.M. (1858). "Report on influence of marriages of consanguinity upon offspring", *Transition of the American Association*, 11:319-425.
- Bhasin, M.K. and S. Nag (1994). "Incidence of consanguinity and its effects on fertility", in Venna Bhasin (ed.), *People, Health and Disease: The Indian Scenario*, (Delhi, Kamla-Raj Enterprises).
- Bittles, A.H. (1994). "The role and significance of consanguinity as a demographic variable", *Population and Development Review*, 20 (3): 561 -584.
- _____ A.R.R. Devi, H.S. Savithri, S. Rajeshwari and N.A. Rao (1985). "Inbreeding and postnatal mortality in South India: effects on the gene pool", *Journal of Genetics*, 64:135-142.
- Bittles, A.H., A.R.R. Devi, H.S. Savithri, R. Sridhar and N.A. Rao (1987). "Consanguineous marriage and postnatal mortality in Kamataka, South India", *Man*, 221736-745.
- Bittles, A.H. and J.V. Neel (1994). "The costs of human inbreeding and their implications for variations at the DNA level", *Nature Genetics*, 8: 118.
- Book, J.A. (1957). "Genetic investigations in a north Swedish population : the offspring of first-cousin marriages", *Annals of Human Genetics*, 21:191-223.
- Bunday, S. and H. Al am (1993). "A five-year prospective study of the health of children in different ethnic groups, with particular reference to the effect of inbreeding", *European Journal of Human Genetics*, 11206-2 19.
- Cavalli-Sforza, L.L. and W.F. Bodmer (1971). *The Genetics of Human Populations* (San Francisco, California, W.H. Freedman and Company).
- Centerwall, W.R. and S.A. Centerwall (1966). "Consanguinity and congenital anomalies in South India: a pilot study", *Indian Journal of Medical Research*, 54: 1160-1 167.
- Centerwall, W.R., G. Savarinathan, L.R. Mohan, V. Booshanam and M. Zachariah (1969). "Inbreeding pattern in rural South India", *Social Biology*, 16:8 1-91.
- CBHI (Central Bureau of Health Intelligence) (1991). *Health Information of India-1991*, (New Delhi, Ministry of Health and Family Welfare).
- DaVanzo, J. (1984). "A household survey of child mortality determinants in Malaysia", *Population and Development Review*, 10 (supplement):307-322.
- Dronamraju, K.R. and M.P. Khan (1960). "Inbreeding in Andhra Pradesh", *Journal of Heredity*, 51:239-242.

- Farah, A.A. and S.H. Preston (1982). "Child mortality differentials in Sudan", *Population and Development Review* , 8:365-383.
- Ginter, E.K., R.F. Garkavtzeva and A.A. Revazov (1980). "Population structure and hereditary diseases in Uzbekistan", in A.W. Eriksson, A.R. Forsius, H.R. Nevalinna, P.L. Workman and R.K. Norio (eds.), *Population Structure and Genetics Disorders* (New York, Academic Press).
- Hobcraft, J. , J. McDonald and S. Rutstein (1983). "Child-spacing effects on infant and early child mortality", *Population Index* , 49(4):585-618
- Hussein, F.H. (1971). "Endogamy in Egyptian Nubia", *Journal of Biosocial Science*, 3:25 1-257.
- IIPS (International Institute for Population Sciences) (1995). *National Family Health Survey (MCH and Family Planning), India, 1992-93*, (Bombay, IIPS).
- Kapadia, KM. (1958). *Marriage and Family in India* (Calcutta, Oxford University Press).
- Maian, A. and R. Mushtaq (1994). "Consanguinity in population of Quetta (Pakistan): a preliminary study", *Journal of Human Ecology* 5:49-53.
- Mosley, W.H. and L.C. Chen (1984). "An analytical framework for the study of child survival in developing countries", *Population and Development Review* , 10 (supplement):25-45.
- Neel, J.V. and W.J. Schull (1962). "The effect of inbreeding on mortality and morbidity in two Japanese cities", *American Journal of Human Genetics* , 48:573-582.
- Naderi, S. (1979). "Congenital abnormalities in newborns of consanguineous and non-consanguineous parents", *Obstetric Gynaecology* , 53: 195-199.
- Ottenheimer, M. (1990). "Lewis Henry Morgan and the prohibition of cousin marriage in the United States", *Journal of Family History* , 15:325-334.
- Padmadas, S. S. P. and Sadasivan Nair (2001). "Consanguineous union and its effect on foetal and infant loss in India", *Genus* , 83-105.
- Ramkumar, L. and S.C. Sood (1961). "TaySachs disease", *Indian Journal of Child Health* , 10:303.
- Rao, P.S.S. and S.G. Inbaraj (1977). "Inbreeding in Tamil Nadu, South India", *Social Biology* , 24:28 1-288.
- Richard, J. and P.S.S. Sundar Rao (1994). "Changes in consanguinity and age at marriage", *Demography India* , 23:115-28.
- Roy, T.K., V. Jayachandran and Sushanta K. Banerjee (1999) "Economic condition and fertility: is there a relationship" ?, *Economic and Political Weekly* , 34(42-43).
- Saheb, S.Y., S.M. Sirajuddin, C.M. Raju, D.B. Sastri and R.K. Gulati (1981). "Consanguinity and its effect on fertility and mortality in Kodava populations of Kodagu district: Kamataka", *Indian Anthropologist* , 11:101 123.

- Stern, c. (1949). *Principles of Human Genetics* (San Francisco, California, W.H. Freedman and Company).
- Stevenson, A.C. and H.A. Wamock, (1959). "Observations on the results of pregnancies in women resident in Belfast: data relating to all pregnancies ending in 1957", *Annals of Human Genetics*, 23 :382-394.
- Sutton, H.E. (1965). *An Introduction to Human Genetics* (New York, Holt, Rinehart and Winston).
- United Nations (1962). *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation*, (17th session, supplement No. 16) (New York, United Nations).
- Whittinghill, M. (1965). *Human Genetics and its Foundations* , (Calcutta, Oxford & IBH Publishing Co.).

The Ageing Population of Brunei Darussalam: Trends and Economic Consequences

*Formal investment by the Government is
needed to care for elderly people, otherwise, huge social
problems with significant economic consequences
are both inevitable and imminent*

By Parvez Azim*

Population ageing has been a topic of considerable interest during the last decade (Knodel, 1999), more so in the developed regions of the world than in the less developed regions. This is so because the process of population ageing has been much slower until recent times in the less developed regions.

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Table 1. Actual and projected population by residential status, 1971-2011, Brunei Darussalam

Year	Citizens and permanent residents		Migrant workers		Totals population	
	Number	Percentage	Number	Percentage	Number	Percentage
1971	112,896	82.9	23,360	17.1	136,256	100
1981	147,861	76.7	44,971	23.3	192,832	100
1991	189,956	72.9	70,526	27.1	260,482	100
1996	214,400	75.4	69,800	24.6	284,200	100
2001	240,100	69.6	104,700	30.4	344,800	100
2006	266,300	68.5	122,400	31.5	388,700	100
2011	293,200	67.2	143,300	32.8	436,500	100

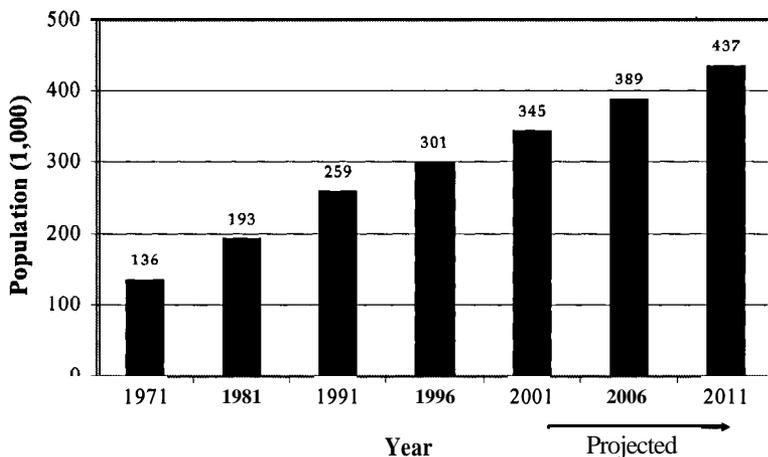
Source: Economic Planning Unit Report: Demographic Situation and Population Projections 1991-2011, Ministry of Finance, Negara Brunei Darussalam, April 1994.

The United Nations (1998) has projected that in some developing countries the “greying” population will increase rapidly in the next few decades. Because no research has ever been published on population ageing issues in Brunei Darussalam, this article was prepared to fill that gap. After a brief discussion of the past population changes in Brunei Darussalam, the future trends in population age structure are described, with the main emphasis being on the ageing segment of the population. This article distinguishes between “citizens and permanent residents” and “temporary residents” (migrant workers). The United Nations projections do not distinguish between those different population groups and thus project the entire population as though it will eventually reach retirement age in Brunei Darussalam. Therefore, it is necessary to make a distinction between the different groups. This article deals with the issue of migrant workers explicitly, and projections have been made separately for them. The article concludes with an assessment of the overall impact of population growth on the economy of the country in general and that of the ageing population on macro-economic variables in particular. The social impact and other implications of the ageing population have also been touched tangentially.

Past and future changes in population

The population of Brunei Darussalam was 136,256 persons, 192,832 persons and 260,482 persons, in 1971, 1981 and 1991 (**table 1**) respectively. These numbers reflect a growth rate of 4.5 per cent and 3.5 per cent for the 10-year intercensal periods 1971-1981 and 1981-1991 respectively. It can be seen from this trend that the population of the country almost doubled between

Figure 1. Population of Brunei Darussalam, 1971-2011



1971 and 1991 (Obben, 1998); it is estimated that it will have tripled by the year 2011 (**figure 1**).

The reduction in the rate of population growth could be attributed to the decline in fertility resulting from the increasing number of females attaining higher education (**table 2**). This has led to a considerable rise in the female labour force participation rate and in the number marrying at a later age. The composite effect of these factors has caused a reduction in birth rates, which are illustrated by the gradual shrinkage of the base of the respective population pyramids of Brunei Darussalam (**figures 2, 3 and 4**).

These population pyramids for 1971, 1981 and 1991 clearly show the changes in the country's age structure. The proportion of people aged 0-14 decreased, the proportion of people aged 15-59 increased and the proportion of people aged 60 and older remained stationary. One factor which held almost steadily throughout the period under consideration has been the 60 years and older population age group. It comprised 4.8 per cent of the entire population of the country in 1971, 4.2 per cent in 1981 and 4.1 per cent in 1991, as shown in the apex of **figures 2, 3 and 4** respectively. The population 0-14 years comprised 43 per cent of the population in 1971, 39 per cent in 1981 and 34 per cent in 1991, a clear downward trend in the young dependents, while the percentage of the 15-64 year age group (economically active people) increased from 52 per cent in 1971 to 57 per cent in 1981 and 61 per cent in 1991.

Figure 2. Population pyramid for Brunei Darussalam, 1971

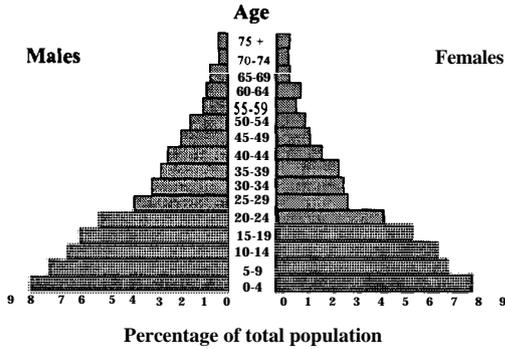


Figure 3. Population pyramid for Brunei Darussalam, 1981

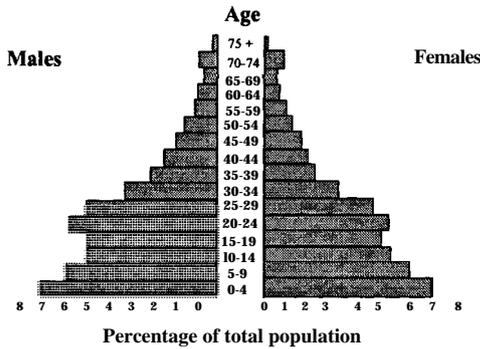


Figure 4. Population pyramid for Brunei Darussalam, 1991

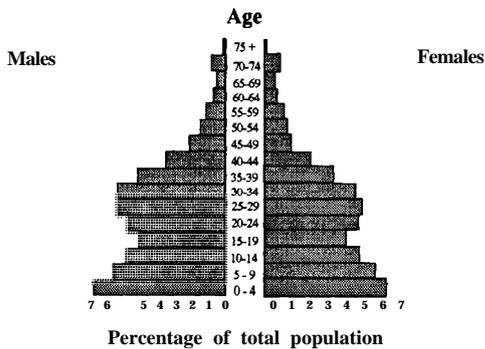


Table 2. Total fertility rate and life expectancy at birth in Brunei Darussalam, 1950-1995

Year	Total fertility rate (children per woman)	Expectation of life at birth (years)	
		Males	Females
1950-1955	7.00	59.6	61.1
1955-1960	7.00	61.0	62.0
1960-1965	6.72	62.5	63.5
1965-1970	5.94	64.0	66.0
1970-1975	5.40	66.9	69.9
1975-1980	4.40	68.1	71.4
1980-1985	3.80	70.1	73.6
1985-1990	3.37	71.5	75.3
1990-1995	3.09	72.4	77.1

Source: United Nations (1999). World Population Prospects: The 1998 Revision, Volume II: Sex and Age (New York, United Nations).

Population ageing

Population statistics reveal that there has been a continuous decline in fertility and a rise in the life expectancy at birth (**table 2**). As a consequence, there has been a rise in the average age of the population, with a subsequent trend towards an ageing population (**table 3**). Owing to this ageing trend, the young dependency ratio (under age 15) will fall and the old-age dependency ratio will rise. In the future, the number of very old (those 75 years and older) is expected to rise sharply as life expectancy continues to go up.

Table 3. Median age of the population by residential status, 1991-2011, Brunei Darussalam

Year	Median age (years)		
	Citizens and permanent residents	Migrant workers	All groups
1991	19.9	28.9	23.4
1996	21.0	28.9	24.2
2001	22.2	28.9	25.1
2006	23.5	28.9	26.0
2011	24.7	28.9	26.8

Source: Economic Planning Unit Report: Demographic Situation and Population Projections 1991-2011, Table 7.1, Ministry of Finance, Negara Brunei Darussalam, April 1994.

As shown in **table 3**, the median age of citizens and permanent residents is projected to increase from 19.9 years in 1991 to 24.7 years in 2011. The corresponding figures for migrant workers are estimated to remain constant at 28.9 years throughout the period under consideration. This implies that the ageing process of the population is solely due to the non-migrant population. Furthermore, the median age of migrant workers was noted to be more than that of local workers throughout the period 1991-2011. The overall median age of all groups is projected to increase from 23.4 years in 1991 to 26.8 years in 2011.

Regarding the economic consequences of this demographic transition, the trend in the ageing of the population will affect everyone in the country. Economists assess the importance of population size and population characteristics in terms of their contribution to the production of goods and services (Anderton, 1995). However, it is not the population size only that matters but the different age distributions of the populations. An ageing population is likely to cause an increase in the number of retirees; consequently, the old-age dependency ratio will increase. Elderly people will draw a pension and will make more demands on the country's health and social services system. The amount of health care and community services needed will increase not only with increasing numbers of elderly people, but also with the age of that segment of the population. These services will be provided by the working population of those aged 15 to 64 years. With the high level of unemployment and the growing elderly population, the future does not look very bright for the country. The ageing of the population will cause an increase in the cost of retirement pensions as well as in the demand for medical care. More geriatricians will be needed in hospitals.

There are many aspects in which ageing is an important issue: for example, the growth of the older segment of the population will lead to a reduction in the size of the work force and a simultaneous growth in the percentage of the population over retirement age. In addition, it may become necessary to re-design buildings and open spaces as the percentage of young people decreases and the proportion of the elderly increases.

Table 4 shows that the number of persons aged 65 years or older, including migrant workers, in Brunei Darussalam was estimated to be 7,000 in 1991. Out of that number, only 400 were migrant workers. This age-group is projected to almost double to approximately 13,800 by 2011; out of that number, only 800 would be migrant workers. The aged (65 years and older) female population of 7,700 will exceed that of the aged male population of 6,100 in 2011. Regarding the percentage of the population aged 65 years or older in Brunei Darussalam, 2.7 per cent of that population group were aged 65

Table 4. Decomposition of the projected population aged 65 and older, by sex and residential status, 1991-2011, Brunei Darussalam

Year	Citizens and permanent residents		Migrant workers		All groups	
	Males	Females	Males	Females	Males	Females
1991	3,400	3,200	200	200	3,600	3,400
1996	3,800	3,800	300	200	4,100	4,100
2001	4,300	5,000	300	300	7,700	8,000
2006	5,000	6,200	400	300	9,400	9,900
2011	5,600	7,300	400	400	6,100	7,700

Source: Based on Economic Planning Unit Report: Demographic Situation and Population Projections 1991-2011, Table 7.5, Ministry of Finance, Negara Brunei Darussalam, April 1994.

years or older in 1991; it is projected that this percentage will rise to 3.2 in 2011.

There has been a continuous increase in the number of migrant workers in Brunei Darussalam. Migrant workers were estimated to account for 17 per cent of the total population in 1971. The percentage of migrant workers rose to 27 per cent of the total population in 1991 and it is projected to rise further to 33 per cent in 2011 (see **table 1**). However, it should be noted that, in spite of such a large number of foreign workers in Brunei Darussalam, they live in the country for a temporary period and leave before retirement age. Thus, they do not become part of the elderly dependent population. This factor must be taken into account in future studies and projections. It is also worth mentioning that the percentage of old-age dependents is currently much higher in the more developed than in the less developed countries (United Nations, 1998), but the pace of ageing in developing countries is more rapid, and their transition from a young to an old-age structure will be more compressed in the future.

When it comes to the ageing population of a country, it is imperative to shed light on life expectancy at age 60. The world has experienced dramatic improvements in longevity. Life expectancy at birth has increased about 19 years since 1950 to its current level of 65 years. In Brunei Darussalam, the United Nations projects that life expectancy at birth will increase from 76 years (1995-2000) to a dramatic level of 81 years by the year 2040. Life expectancy at age 15 is projected to rise from 62 years (1995-2000) to 67 years in the next four decades. It is also observed that female life expectancy at birth is greater than that of males by a margin of about six years. It has also been concluded that the oldest old (75 years and older) females outlive their male peers. The

reason for this phenomenon is that males are exposed to more harsh environments and thus are subject to more wear and tear than females who in general are more likely to stay at home. In Brunei Darussalam, of those surviving to age 60, by 2040 men can expect to live another 20 years and women, an additional 26 years. The United Nations has projected that men reaching age 60 in the least developed countries can expect only 14 more years of life and women, 16 years, while in the more developed countries, life expectancy at age 60 is 18 years for men and 22 years for women. It is encouraging to note that life expectancy in Brunei Darussalam is almost the same as in the more developed countries of the world.

As far as the percentage of women, excluding migrant workers, in the older population of Brunei Darussalam is concerned, the female population will far exceed the male population in 2011 (**table 4**). In 1991, however, there were more males than females in the older population, excluding migrant workers. This reversal of the trend could be termed as old-age feminization. The reason is that women are generally more likely to survive to older ages. The percentage of women in the older age groups is higher in the more developed countries than in the less developed countries owing to larger differences in life expectancy between the sexes in the more developed countries. The same situation is projected to prevail in Brunei Darussalam.

Changing dependency ratios

Dependency ratios have important implications for social security schemes, particularly traditional pay-as-you-go systems (United Nations, 1998), in which current workers pay taxes used for the benefit of current retirees. The proportion of the population which is economically inactive (children below 15 years of age and adults above the retirement age of, say, 65) are classified as the dependent population. This ratio indicates roughly how many dependents must be supported by every 100 people in the economically active group. It can only be approximate, as some people younger than 15 or older than 65 may be in full-time employment; furthermore, some people older than 15 may be pursuing full-time education. The dependency ratio is considered to be one of the most important measurements of population structure, because the revenue obtained from the active population has to support the non-economically active sector for things such as schooling, pensions, food, clothing and shelter, health care and housing. Many of these services have to be provided by the Government and are the subject of planning.

The total dependency ratio in Brunei Darussalam has gradually declined from 59 in 1991 to 48 in 2011 (**table 5**). In 1991, there were 59 dependents per

Table 5. Dependency ratios by residential status, 1991-2011, Brunei Darussalam

Year	Citizens and permanent residents			Migrant workers			All groups		
	<15 years	65 and older	<15+65 and older	<15 years	65 and older	<15+65 and older	<15 years	65 and older	<15+65 and older
1991	69.6	6.1	75.7	26.1	0.7	26.9	54.9	4.3	59.2
1996	64.0	6.1	70.1	26.1	0.7	26.9	50.7	4.2	54.9
2001	58.7	6.4	65.2	26.1	0.7	26.9	46.9	6.9	53.8
2006	53.1	6.7	59.8	26.1	0.7	26.9	43.2	7.3	50.5
2011	48.5	6.9	55.3	26.1	0.7	26.9	39.9	8.7	47.9

Source: Economic Planning Unit Report: Demographic Situation and Population Projections 1991-2011, Table 7.4, Ministry of Finance, Negara Brunei Darussalam, April 1994, and the author's own calculations.

100 persons of working age (15-64 years). Out of these 59 dependents, 55 were young dependents and only four were elderly. However, the percentage of young dependents has been falling, while that of elderly dependents has been rising among citizens and permanent residents. Among migrant workers, almost all the dependents are young dependents.

The data in **table 6** reveal that the overall growth rate of the employed population was 5.65 per cent during the period 1971-1981; 10 years later, during the period 1981-1991 it was 4.7 per cent. An interesting feature of the data concerns the more than double growth rate of employed females as compared with males between the periods 1971- 1981 and 1981- 1991. While the growth rates of unemployed males increased from 2.6 per cent in the period 1971-1981 to 4.04 per cent in the period 1981- 1991, that of females decreased from 2.96 per cent to 1.43 per cent for the same period.

The projections indicate consistently rising trends of employed males and females over the period under consideration (1995-2010), but the growth rates of employed females were noted to be more than those of males. The growth rates of unemployed males and females were almost the same during the period 1971-1981 except during the period 1981-1991 (**table 6**).

It is encouraging to note that the employed female workforce increased manifold from 7,000 in 1971 to 37,000 in 1991 (Yean and Tan, 1999); by contrast, the number of employed males increased from 34,000 to 75,000 for the same period. This trend towards rising female participation in the workforce

Table 6. Population distribution by activity status and sex, 1971-2010, Brunei Darussalam

Activity status	1971	1981	1991	1995	2000	2005	2010	Average annual growth rate (%)	
								1971-1981	1981-1991
Total:									
Employed	41,000	71,000	112,000	186,000	204,000	230,000	251,000	5.65	4.70
Unemployed	36,000	48,000	59,000	115,000	123,000	124,000	129,000	2.80	2.08
Males:									
Employed	34,000	54,000	75,000	96,000	107,000	120,000	130,000	4.64	3.38
Unemployed	9,000	11,000	16,000	59,000	64,000	65,000	65,000	2.60	4.04
Females:									
Employed	7,000	17,000	37,000	85,000	97,000	108,000	120,000	9.35	8.16
Unemployed	28,000	37,000	43,000	56,000	60,000	63,000	64,000	2.96	1.43

Source: Figure for the period 1971-1991 are from Teo Siew Yean and Tan Siew Ee (1999). "Population and labour forces in Brunei Darussalam: patterns and structural changes", *Readings on the Economy of Brunei Darussalam*: (Universiti Brunei Darussalam), pp. 101-105; figures for the period 1995-2010 are projected.

Note: Numbers have been rounded.

should help to reduce the current reliance on foreign workers in almost all sectors of the economy. This trend could be due to more enlightened employer attitudes towards the hiring of females, the better educational qualifications of women and the more lucrative job opportunities for females in the rapidly expanding economy of Brunei Darussalam.

Population by residential status

The data on foreign-born persons categorized as temporary workers show an upward trend, rising from 23,360 persons in 1971 to 44,971 persons in 1981 and to 70,526 persons in 1991, for a growth rate of 6.77 per cent in the period 1971-1981 and 4.61 per cent in the period 1981-1991 (**table 7**). The distribution trend of the temporary residents increased from 17.1 per cent in 1971 to 23.3 per cent and 27.1 per cent in 1981 and 1991 respectively. Another noteworthy feature concerns the decline in the number and proportion of permanent residents and a declining proportion of citizens of Brunei Darussalam. The annual growth rate of citizens was slightly slower for the period 1981-1991 as compared with the period 1971-1981. The number of citizens increased less than two-fold, from 92,153 persons in 1971 to 171,099 persons in 1991. The

Table 7. Population by residential status in Brunei Darussalam, 1971,1981 and 1991

Year	Citizens ^a	Permanent residents ^b	Temporary residents ^c	Total
Numbers:				
1971	92,153	20,743	23,360	136,256
1981	127,676	20,185	44,971	192,832
1991	171,099	18,857	70,526	260,482
Growth rate per annum (%):				
1971-1981	3.31	-0.27	6.77	3.53
1981-1991	2.92	-0.68	4.61	3.05
Distribution (%):				
1971	67.6	15.2	17.1	100
1981	66.2	10.5	23.3	100
1991	65.7	7.2	27.1	100

Source: Various issues of *Brunei Darussalam Statistical Yearbooks*.

a The term citizens refers to the holders of the Brunei Darussalam Yellow Identity Card;

b The term permanent residents refers to the holders of the Brunei Darussalam Purple Identity Card;

c The term temporary residents refers to the holders of the Brunei Darussalam Green Identity Card.

number as well as percentage of permanent residents in Brunei Darussalam decreased during the period under consideration. The main cause could be emigration, which produced a negative growth rate.

It is very important to note that temporary residents more than doubled in number from 23,360 persons in 1971 to 70,526 persons in 1991. This increase should not be surprising, the reason being that Brunei Darussalam is an underpopulated country. Over the years, the continuous recruitment of foreign workers having a wide variety of skills has caused this change.

According to the 1971 population census, out of the total population of 136,256 people in Brunei Darussalam, 101,511 persons or 74.5 per cent were born in the country and the remaining 34,745 persons or 25.5 per cent were born outside Brunei Darussalam. As can be seen from table 8, the number of locally born persons had increased from 101,511 persons in 1971 to 139,167 persons in 1981 and 184,388 persons in 1991. However, in terms of proportion, the locally born population decreased from 74.5 per cent in 1971 to 72.2 per cent and 70.8 per cent in 1981 and 1991 respectively. There was an increase in the share of persons born in other countries in the total population of the country between 1971 and 1991.

Table 8. Classification of the population according to citizenship status in Brunei Darussalam, 1971,1981 and 1991

Country of birth	1971	1981	1991	1971	1981	1991	Growth rate	
	(Number)	(Number)	(Number)	(percen- tage)	(percen- tage)	(percen- tage)	1971- 1981	1981- 1991
Brunei Darussalam	101,511	139,167	184,388	74.5	72.17	70.79	3.20	2.85
Foreigners ^a	34,745	53,665	76,094	25.5	27.83	29.21	4.44	3.55
Total	136,256	192,832	260,482	100.0	100.0	100.0	3.53	3.05

Source: Population Census Reports, 1971, 1981 and 1991.

a Foreigners include people from Australia; Bangladesh; China; Hong Kong, China; India; Indonesia; Malaysia; Nepal; Netherlands; New Zealand; Pakistan; Philippines; Republic of Korea; Singapore; Sri Lanka; Taiwan Province of China; Thailand; United Kingdom of Great Britain and Northern Ireland; and some other countries which are not mentioned.

It may be observed from **table 8** that the population of citizens of Brunei Darussalam grew at an annual average rate of 3.20 per cent and 2.85 per cent for the intercensal periods 1971-1981 and 1981-1991 respectively, which was slower than the population growth rate of foreigners, which grew at 4.44 per cent and 3.55 per cent respectively for the same periods. In 1991, citizens of Brunei Darussalam constituted just over half (51.09 per cent) the country's workforce (Tisdell, 1999:214); the proportion of temporary residents (migrant workers) aged 65 years and older amount to less than 1 per cent of the workforce.

Regarding the implications of the large number of younger temporary residents in Brunei Darussalam, it should be noted that a large number of these workers could assist the Government via the payment of taxes to be used for providing pensions and health care for citizens and permanent residents. Most foreign workers in Brunei Darussalam live there for a temporary period; they leave before retirement age, to be replaced by younger migrants, so they do not become part of the elderly population of the country. Therefore, it is highly recommended that a progressive income tax be imposed on temporary residents. Brunei Darussalam, as a rentier economy (*ref:* its so-called unearned income from oil and natural gas), is heavily dependent on migrant workers for the operation of its economy. Government expenditure in the form of transfer payments to the aged and unemployed populations, though financed by an equivalent allocation from income taxes, would have a positive net multiplier effect on the national income. A taxation policy which redistributes income from the rich, with their relatively smaller marginal propensity to consume, to the poor, with their higher marginal propensity to consume, would likely increase aggregate demand in the economy, which in turn would raise the national income and hence the standard of living.

The macroeconomics of ageing

To modernize and foster economic development in a country, injections of capital are needed and these inputs should come from domestic savings. But the composite impact of ageing and the rising dependency ratio in the country will have adverse effects on household savings. Less savings mean less availability of funds for banks to lend. This situation will exert an upward pressure on interest rates. Pensioners living on meagre allowances will not be spending enough and therefore producers will not be investing and fully utilizing resources. Therefore, less savings means less investment, which in turn will decrease the aggregate supply of goods and services. Thus, the fall in national income will be multiplied. Less income means lower tax receipts for the Government. The fall in national income will reduce both consumption and savings as well as the demand for imports: the larger the marginal propensity to import, the bigger the reduction in imports. The reduction in demand may also put downward pressure on prices and wages. The reduction in demand will widen the deflationary gap (demand-deficient unemployment) in the economy. Less imports (by Brunei Darussalam) implies less exports (of the country's trading partners). In other words, if a country sells less to a trading partner, it cannot afford to buy as much as it did when it sold more. The net effect of these two changes in exports and imports on the current account component of the country's balance of payments is uncertain. Whether the current account will go into deficit or surplus depends on which of these effects is the greater. If the reduction in exports is greater than the reduction in imports, the current account will go into deficit. This may cause depreciation of the country's currency against the major currencies of the world. The opposite will hold true if the current account goes into surplus.

The current account deficit will reduce the supply of money, but on the other hand the fall in national income will reduce the demand for money. The net effect on interest rates will depend on which of these effects outweighs the other.

Regarding the pattern of production, the ageing population will force producers to change the pattern of production, avoiding or reducing the production of goods needed by the country's young population and increasing the production of goods which are demanded by its ageing population. This will result in a diversion of resources in the economy from the production of goods suitable for the young segment of the population to the ones required by the older segment.

A growing elderly population is likely to be of increasing significance to sellers of goods and services, because they will be representing an important and growing segment of the market. Firms will increasingly have to switch

their products to appeal to middle-aged and old-aged people. It will be necessary for firms to carry out continuous new product development programmes, keeping in mind the requirements of the ageing population. More research will be needed by firms to determine the likely level of demand at different ages, then they will have to calculate which is the most profitable. More would be charged for a product with a relatively low price elasticity of demand.

The changing composition of the population has major implications for the Government. Old-age dependents tend to have very low incomes and therefore need income support. They will have to look to their families for care in a way that has not changed in Brunei Darussalam for centuries. But as time passes, fewer and fewer people on whom such responsibilities will fall may be willing to take on such burdens. The greying population may not only slow economic growth, but also heighten social tension and weaken cohesion in the community. Many elderly people are unable to look after themselves and therefore need care in the community. They are particularly expensive for the Government in terms of pension and social services budgets, imposing strains upon government finance. Because they have been brought up in a society accustomed to affluence, their incomes will have to be increased in real terms if the standard of living of the elderly is to be maintained at its current level, or there will have to be much more private provision by individuals. With the population ageing as it is currently, the Government should encourage more voluntary welfare organizations and private operators to provide community-based health-care services (Sun, 1998). The Government of Brunei Darussalam has long recognized that there is a growing number of people with no family to support and who are not ill enough to be hospitalized but who need continuous medical or nursing care in a community-based setting. To tackle the problem, the Health Ministry must take appropriate early action.

An ageing population will have adverse impacts on the standard of living of workers in the population (Anderton, 1995). The higher the dependency ratio, the lower will be the income of workers if dependents are to receive a given income. Workers will see their share of national income fall over the next 40 years if the income of pensioners increases at the same rate as that of workers. A sharp increase in the proportion of pensioners in Brunei Darussalam will cause a rise in net financial liabilities of public pension and health care schemes. A rising percentage of this expenditure in gross domestic product (GDP) will leave less money for the Government to spend on other projects. Tough decisions will have to be made in order to deal with an ageing society. One response to this situation is for the Government to cut expenditure on state pensions; otherwise, state pensions would absorb an ever-increasing percentage of the total budget in the next half century.

Based on actuarial projections, even small changes in assumptions concerning economic growth, retirement age, earnings and other variables could result in big revisions to pension forecasts. However, it can be said with confidence that the ageing trend will not change much during the next four decades.

Conclusions, implications and recommendations

With the country's declining fertility rate resulting in a reduction in the proportion of young people in the population, the trend towards ageing may have serious implications for Brunei Darussalam such as the potential for limitation of the labour supply. Furthermore, females are becoming more independent and marrying later in life. Thus, a liberal, well-structured immigration policy could do a lot of good for the economy because foreign workers will be needed at the higher and lower ends of the skills scale.

To respond to this mounting demographic pressure, the Government must come up with new policies, which could, for example, limit salary-related benefits for new retirees by a certain percentage, and may consider gradually raising the pensionable age from the current 55 years to 65. These and other measures would enable the Government to cut the annual pension bill by a considerable amount and will put the system's long-term finances on a viable footing. Unless something is done urgently, the pension fund will go into the red within a decade or so. With a rapidly greying population, the issue is of more than mere academic interest. To establish a healthy ageing society, formal investment by the Government is needed to care for elderly people, including rapid development of pension schemes and establishment of a medical insurance system; otherwise, huge social problems with significant economic consequences are both inevitable and imminent. Last but by no means least, the Government must continue with its very impressive education policy to tackle the high population growth rate. Better education, while a worthwhile end in itself, also has impacts on family planning. Education fosters fertility decline as it changes the perception of parents regarding the value of children (Morshidi and others, 1999).

Data on foreign-born persons have shown a rising trend both proportionally and in terms of absolute numbers. This trend could be attributed to Brunei Darussalam's import of both skilled and unskilled workers to meet the needs of the growing economy. Since there currently is no income tax in Brunei Darussalam, it is recommended that a progressive income tax be levied by the Government on foreign workers. The tax revenue collected should be spent on the welfare of the country's ageing population. Government expenditure, though financed by an equivalent allocation from income taxes,

would have a positive net multiplier effect on the national income. A taxation policy which redistributes income from the rich with their relatively smaller marginal propensity to consume to the poor with their higher marginal propensity to consume will tend to increase aggregate demand in the country. This fiscal tool will reduce the strain on the Government's tight budgetary position. Brunei Darussalam needs to undertake a comprehensive review of taxation systems in order to broaden and strengthen the Government's tax revenue base. Such a review should take into account the needs of an ageing population without discouraging investment in the country. Such an approach will strengthen government finances by controlling government expenditure through clear prioritization.

To conclude, unless adequate measures are taken in the course of time, this ageing of the country's population will affect its ability to develop sustainably. It must be remembered that development and population are interacting variables, each affecting the other. Judicious fiscal and monetary economic policies will have to be formulated and implemented to ward off the adverse consequences on the economy of the ageing population.

References

- Anderton, Alain (1995). *Economics* (Oxford, Alden Press), pp. 332-335.
- Knodel, John (1999). "The demography of Asian ageing: past accomplishments and future challenges" *Asia-Pacific Population Journal* 14(4):39-56.
- Morshidi, Abdul Malik and Shamim Ahmad Siddiqui (1999). "Cause and implications of the declining population growth rate in Brunei Darussalam", *Readings on the Economy of Brunei Darussalam*, pp. 132-457.
- Obben, James (1998). "Towards the explanation and abatement of road casualties in Brunei - a contribution from the toolkit of economists" *TINJAUAN Policy and Management Review*, (Universiti Brunei Darussalam), No. 2, p. 58.
- Sun, Fubin (1998). "Ageing of the population in China: trends and implications", *Asia-Pacific Population Journal*, 13(4):75-92.
- Tisdell, Clem (1999). "Brunei's quest for sustainable development: diversification and other strategies" *Readings on the Economy of Brunei Darussalam*, (Universiti Brunei Darussalam), pp. 201-225.
- United Nations (1999). *World Population Prospects: the 1998 Revision, Volume, II: Sex and Age*, (New York, United Nations).
- _____ (1998), United Nations website www.popin.org/pop1998/8.htm 9 May 2000.
- Yean, Teo Siew and Tan Siew Ee (1999). "Population and labour forces in Brunei Darussalam: patterns and structural changes", *Readings on the Economy of Brunei Darussalam* (Universiti Brunei Darussalam), pp. 101-105

Socio-demographic and Economic Characteristics of Migrant Heads of Households and the Consequences of their Migration in Fiji, 1992-1993

By Dharma Chandra*

Internal migration is an integral part of the development process. It is influenced by development (such as the building of roads, economic activities and employment opportunities in certain areas) and it influences development (destination areas gain in skills and capital while areas of origin lose out) (Chandra and Chandra, 1998:60). There are relationships between and among migration, urbanization and socio-economic development. According to Skeldon (1992:45): "At a very simple level, there is a clear relationship between economic development and demographic variables. The most developed countries have the highest levels of urbanization . . . and they have low fertility and low rates of infant mortality. The least developed countries, however, have low levels of urbanization . . .".

Population migration reflects people's responses to many different factors such as social and economic inequalities, social and cultural conditions and constraints, and other infrastructure and accessibility aspects at places of origin

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and destination. Studies have generally indicated that migration occurs mainly for economic reasons (Parera, 1993; Thadani and Todaro, 1984; Todaro, 1989, 1994 and Young, 1994). Economic motives, such as the search for cash employment, improvements to and upgrading of jobs, resulting 'in increased wages and salaries, improvements in education for employment-related needs and relocation to gain close proximity to jobs are important determining factors for migration. Skeldon (1997:9) indicates that ". . . migration allows the circulation of goods, money and ideas, as well as people between urban and rural sectors. It concentrates a population that . . . can create a dynamic economy and society".

In 1996, Fiji's total population was 775,077. Two major ethnic groups comprise 95 per cent of the population: indigenous Fijians (51 per cent) and Indo-Fijians (44 per cent). Indo-Fijians represent fourth and fifth generation descendants of the indentured labourers brought from India to work on sugar-cane farms. Forty-seven per cent of the total population was urban in 1996, with Suva, the capital city, and its peri-urban areas comprising 52 per cent of the total urban population (Bureau of Statistics, 1999b:137).

Internal migration has been a significant factor in Fiji's urbanization and regional development. In 1996, for instance, 37 per cent of the total population aged five years and older were internal migrants representing both lifetime and recent migrants, a slight increase from 35 per cent in 1986 (Bakker, 1999:49). Among lifetime migrants aged five years and older, 38 per cent were rural-to-urban migrants, 28 per cent urban-to-urban migrants, 22 per cent rural-to-rural migrants and 13 per cent urban-to-rural migrants. Among recent migrants aged five years and older, 32 per cent were recent rural-to-urban migrants, 35 per cent urban-to-urban migrants, 19 per cent rural-to-rural migrants and 14 per cent urban-to-rural migrants (Bakker, 1999:79). Suva, the country's primate city, and its peri-urban areas are the dominant destinations for most rural-to-urban migrants.

Both ethnicity and gender are important in the internal migration process. Rural-to-urban migration is the most significant type of migration for Fijians, compared with urban-to-urban migration for Indo-Fijians; urban-to-rural migration is the least important type of migration for both ethnic groups (Bakker, 1999:79-80). Males and females are equally important in the migration process (Bakker, 1999: 109).

Internal migration, especially rural-to-urban migration, is of special concern to the Government of Fiji because of its relationship to the issues of unemployment, crime, poverty and housing, particularly in urban areas. People

will continue to be drawn into urban areas for employment and educational opportunities. The expiry of agricultural land leases, growing landlessness among Indo-Fijians, unemployment and poverty, and a general slowdown in economic activity will also push people to seek social and economic benefits in urban areas. Internal migration, especially rural-to-urban migration, is likely to intensify in the aftermath of the coup d'état¹ in 2000.

This paper discusses the findings of the Fiji Employment and Unemployment Survey, 1992-1993, conducted by the Fiji Bureau of Statistics. The survey was a complex one, consisting of three schedules: (a) a household survey, (b) demographic and economic activity, and migration survey, and (c) survey of migrant heads of households. The data analysis of this paper is based on responses to schedule 3 — migrant heads of households. The sample size for this schedule was 2,416, all of whom were migrant heads of households who had been identified from the larger demographic and economic activity and migration survey, where data were gathered from 6,000 households. Migrant heads of households comprised about 40 per cent of the total sample. The data analysis is mainly on the social, economic and demographic characteristics of the migrant heads of households. The true extent of migration in the population was not discernible because of this special category of respondents. Nevertheless, the data are extremely useful as the survey included detailed aspects of the migration process and the perceptions of the migrant heads of household about their social and economic conditions before and after migration.

It is important to note that the survey was conducted five years after the two military coups d'état that occurred in 1987. These events had important repercussions on the ethnicity of the migrants and the motivations for internal migration because, from 1987 to 1991, an average of 5,000 people (with the overwhelming majority being Indo-Fijians) left Fiji annually to settle abroad. The majority of those who left were skilled people and professionals (Chandra, 1997; Chetty and Prasad, 1993). The events of 1987 perhaps had a residual effect on the nature, characteristics and the motivations of internal migrants.

The aim of this paper is to provide a statistical profile of the migrant heads of households on the following topics: origin and destination, social and demographic characteristics, motivations for migration, the nature of migration, living conditions of migrants at their place of destination, and the social and economic consequences of migration. It also provides gender and ethnicity comparisons and the perceptions of the migrant heads of households about their social and economic conditions before and after migration. Finally, it identifies some policy implications related to continued urbanization and migration.

Table 1. Migrant heads of households by their urban and rural current place of residence and ethnicity, 1992-1993

Current place of residence	(percentage)		
	Fijians	Indo-Fijians	Total
Urban Suva	27	28	28
Other urban	29	32	31
Rural	44	40	41
Total	100	100	100
n	982	1,305	2,416

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

Unlike all other previous studies of migration that were based on census data, this study is unique because it is based on a special migrant survey which collected detailed information on socio-economic conditions before and after migration. The impact of migration is gauged from the perspectives of migrants, as each migrant is the focus of the migration process. This study therefore fills an important gap in migration research in Fiji.

Origin and destination areas of migrant heads of households

The origin and destinations of migrants are analysed by using three categories: current place of residence (at the time of the survey), previous place of residence (immediately before the current place of residence) and the place of birth, by city, town or settlement. These three categories make it possible to trace rural-to-urban, urban-to-rural, rural-to-rural and urban-to-urban movement. Recent migrants are defined as those who moved from their previous place of residence in the five years prior to the survey. These were enumerated at their current place of residence. Lifetime migrants are those whose previous place of residence and their current place of residence is different from their place of birth.

Urban and rural distribution

The migrant heads of households were living predominantly in urban areas (**table 1**). The Suva urban area had 28 per cent of the migrant heads of households, while the other 31 per cent of the urban-based migrants were distributed among the rest of the urban centres — Nausori, Lautoka, Nadi, Ba, Sigatoka, Labasa, Levuka, Rakiraki, Tavua and Korovou. The majority of both Fijian and Indo-Fijian migrant heads of households were living in Suva and other urban areas.

Table 2. Recent pattern of internal migration in Fiji, 1992-1993

	(percentage)			
	Fijians	Indo-Fijians	Total	1,996 census data
Urban to urban	30	37	36	35
Urban to rural	21	11	16	14
Rural to urban	25	23	22	32
Rural to rural	24	29	26	19
n	972	1,288	2,237	

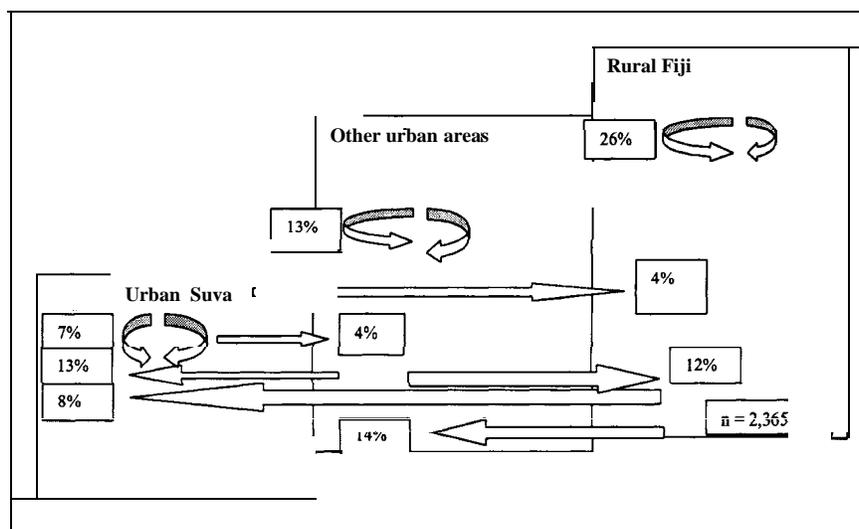
Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993, and Bureau of Statistics, 1996 Fiji Census of Population and Housing, General Tables, Parliamentary Paper No. 43 of 1998, (Suva, Government of Fiji, 1999).

Table 2 and **figure 1** show the extent and pattern of recent² rural-to-urban and intra-urban migration, and urban-to-rural and intra-rural migration. Recent urban-to-urban migration is more pronounced than rural-to-urban migration. Slightly more Indo-Fijians than Fijians moved from urban to urban locations. Recent rural-to-urban and urban-to-rural migration was also significant. Slightly more Fijians than Indo-Fijians migrated from urban to rural areas and from rural to urban areas. The patterns shown in the survey data were very similar to those found in the 1996 census, except for rural-to-urban migration, which increased by 10 per cent. This increase was mainly due to urban boundary changes. This consistency in the findings validates the survey data (**table 2**).

Further analysis of recent movement and counter movements (**figure 1**) demonstrates the dynamic nature of the migration process: both intra-urban and intra-rural migration are important patterns in Fiji. This reflects a high degree of location and relocation of populations both in urban and rural areas.

Recent rural-to-urban migration, however, is more pronounced than urban-to-rural migration. However, it does not show any specific pattern of step-wise migration; migrants do not necessarily move from rural areas to small towns and from there to a large city. The data show that sizable proportions of migrants move from rural areas to the largest urban centre, Suva, and likewise migrants move from urban Suva to rural Fiji, although such moves are not as pronounced. More importantly, migrants move from other urban areas into rural areas as well as into urban Suva. The dynamic nature of such migration demonstrates the balancing of the population according to people's economic and social needs. Furthermore, these patterns also indicate that population circulation is an important feature in Fiji and the Pacific (Chandra, 1981; Walsh, 1982; Bureau of Statistics, 1989).

Figure 1. Dynamics of recent internal migration in Fiji



Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

Socio-demographic characteristics of migrant heads of households

Gender, ethnicity, age and marital status

Migrant heads of households are predominantly males (93 per cent). This pattern, which is consistent among all ethnic groups (**table 3**), is not surprising as both Fijian and Indo-Fijian societies are male dominated. The traditional role of the male is that of head and provider for the household members, irrespective of whether he earns the household's income or not. Even in households where women earn more income for the household than men, women still refer to the men as the head of the household. Indo-Fijians have slightly more male migrant heads of households compared with Fijians and "other" ethnic groups. The small proportion of women who were heads of households were most likely widowed, separated, divorced or never married, and economically independent (discussed below). There were more Fijian female migrant household heads than Indo-Fijians.

The age distribution of migrant heads of households for males and females for all ethnic groups (**table 4**) shows that the majority of them were below 40 years of age. However, when ethnicity gender and age groups for

Table 3. Sex and ethnicity of migrant heads of households, 1992-1993

	(percentage)			
	Males	Females	Total	Percentage of total migrant heads
Fijians	90	10	100	41
Indo-Fijians	95	5	100	54
Others	92	8	100	5
Total population	93	7	100	100
n	2,241	175	2,416	2,416

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

women are examined, a different pattern emerges. In the case of Indo-Fijian females, most migrant heads of households were over 40 years of age. A possible explanation is migration of widowed and divorced women. The reverse is true for Fijian females. There were twice as many Fijian women heads of households aged 20-29 years old as Indo-Fijian.

The majority of male migrant heads of households among all ethnic groups, were married (**table 5**). Among all ethnic groups, half the migrant women heads of households were widowed, divorced or separated. Fijians represented a slightly higher proportion than Indo-Fijians and "other" ethnic groups among the never-married migrant heads of households. This group perhaps represented a fairly large proportion of those who were never married and in the 20-29 age group. The high proportion (46 per cent) of Fijian female heads of households who were aged 20-29 years (**table 4**) indicates the

Table 4. Age distribution of migrant heads of households by ethnicity 1992-1993

Age groups	(percentage)					
	Fijians		Indo-Fijians		Total for all ethnic groups	
	Males	Females	Males	Females	Males	Females
20-29 years	26	46	28	17	27	34
30-39	41	32	39	22	40	27
40-49	23	17	22	32	23	24
50-59	7	3	7	20	7	11
60+	3	1	4	9	3	4
Total	99	99	100	100	100	100
n	884	93	1,231	69	2,233	173

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

Table 5. Marital status and ethnicity of migrant heads of households, 1992-1993

Ethnic groups	(percentage)				Total	n
	Never married	Married	Widowed, divorced or separated			
Fijians						
Males	8	92	0	100	100	887
Females	35	40	25	100	100	95
Total	10	87	3.3	100	100	982
Indo-Fijians						
Males	4	95	1	100	100	1,236
Females	4	13	83	100	100	69
Total	4	92	6	100	100	1,305
Others						
Males	3	95	2	100	100	118
Females	18	27	55	100	100	11
Total						
Total for all ethnic groups						
Males	5	94	1	100	100	2,241
Females	22	29	50	100	100	175

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

emergence of young, economically independent single women who are the heads of their households and are mobile. In the case of Indo-Fijian women, the overwhelming majority were widowed, divorced or separated. It is also interesting to note that about 40 per cent of the Fijian women and 13 per cent of Indo-Fijian women who were married were also recorded as being the household heads. This may indicate that their spouse was either not working and the women heads assumed all economic responsibilities, or that the spouse was not currently present in the household and living elsewhere.

Table 6 shows that the majority of the never-married migrant heads of households were 20-29 years old. The young and single have a greater propensity to migrate. However, the married migrant heads of households were also generally young: 66 per cent were younger than 40 years of age.

Education, ethnicity and sex

Among all ethnic groups, a higher proportion of migrants had secondary or post-secondary education than solely primary education (**table 7**). However, there were gender and ethnic differences in the level of education and

Table 6. Age distribution of migrant heads of households by marital status, 1992-1993

Age groups	(percentage)				n
	Never married	Married	Widowed, divorced or separated	Total	
20-29 years	81	25	5	28	663
30-39	15	41	30	39	938
40-49	4	23	37	23	545
50-59	0	7	17	7	174
60+	0	3	11	4	86
Total	100	100	100	100	
n	142	2,152	112	2,406	2,406

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

migration. Fijian and “other” male migrant heads of households had a higher proportion of those who had upper secondary and post-secondary education compared with Indo-Fijian males. A high degree of emigration of educated Indo-Fijian males in the five years prior to the survey (following the 1987 military coups d’etat) perhaps explains their low proportion among internal migrants. Another important finding is that Fijian females represented the largest percentage of those with secondary and post-secondary levels of

Table 7. Educational level of migrant heads of households by ethnic group and sex, 1992-1993

Ethnic groups	(percentage)				Total	n
	Primary	Lower secondary	Upper secondary	Post-secondary		
Fijians						
Males	10	40	38	11	100	886
Females	7	32	44	17	100	95
Total	10	40	39	12	100	981
Indo-Fijians						
Males	27	35	29	9	100	1,235
Females	64	23	9	4	100	69
Total	29	35	28	9	100	1,304
Others						
Males	10	36	36	18	100	118
Females	18	18	36	27	100	11
Total	11	35	36	19	100	129
Total for all ethnic groups	20	37	33	10	100	2,414

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

Table 8. Reasons for migration by sex of migrant heads of households, Fiji, 1992-1993

Reasons for migration	(percentage)		
	Males	Females	Total
Employment/seeking better employment	14	11	14
Job transfer	34	27	33
Education and medical reasons	5	6	5
Family reasons	8	13	8
Being near job	9	13	10
Other	31	30	31
Total	100	100	100
n	2,236	174	2,410

Source : Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

education relative to Indo-Fijian women: 44 per cent and 17 per cent had upper secondary and post-secondary education compared with 9 per cent and 4 per cent respectively. This supports our earlier finding that the Fijian female head of household is more likely to be young, well educated, never-married and presumably economically independent, while the Indo-Fijian female head of household is more likely to be less educated and perhaps widowed, divorced or separated.

Motivation for migration

Sex, marital status and ethnicity

Most migration occurred as a result of job transfer (33 per cent) and for “other”³ reasons (31 per cent), followed by employment or seeking better employment (**table 8**). The transfer of jobs to some extent explains the motivation for migration — heads of households utilized the opportunity to fill positions vacated by skilled and professional people, especially Indo-Fijians who departed to take employment or live abroad.

Gender differences in migration for employment-related reasons, such as seeking employment, job transfer and being near jobs, generally were not significant (**table 8**).

The never-married migrant heads of households moved predominantly for job-related reasons (84 per cent) that included job transfers (54 per cent) followed by seeking employment or seeking better employment (18 per cent)

Table 9. Reasons for migration, and marital status of migrant heads of households in Fiji, 1992-1993

Reasons for migration	(percentage)		
	Never married	Married	Widowed, divorced or separated
Employment/seeking better employment	18	14	10
Job transfer	54	33	14
Education and medical reasons	3	5	7
Family reasons	3	8	15
Being near job	12	10	6
Other	11	31	48
Total	100	100	100
n	152	2,147	111

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992- 1993.

and being near their job sites (12 per cent). A high proportion among those who were married had also moved for job-related reasons, but this was not as marked as for never-married people. Those migrant heads of households who were widowed, divorced or separated moved mainly for “other” reasons as well as for family-related reasons (**table 9**). Nearly twice as many Fijians and “other” heads of households than Indo-Fijians migrated for job transfer, which could possibly stem from the much higher representation of Fijians and “others” in the civil service⁴ (**table 10**).

Table 10. Reasons for migration and ethnicity of migrant heads of households, Fiji, 1992-1993

Reasons for migration	(percentage)			
	Fijians	Indo-Fijians	Others	Total
Employment/seeking better employment	13	15	10	14
Job transfer	46	24	30	33
Education and medical reasons	6	4	6	5
Family reasons	7	9	8	8
Being near job	9	10	17	10
Other	20	39	29	31
Total	100	100	100	100
n	981	1,300	129	2,410

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992- 1993.

Table 11. Nature of migration within ethnic groups, 1992-1993

(percentage)

Nature of migration	Fijians		Indo-Fijians			Total (all ethnic groups)			
	Males	Females	Males	Males and females	Females	Males	Males and females	Females	Males and females
Alone	12	37	15	6	12	6	9	25	9
Migrated with some dependants ^a	9	22	11	6	4	6	7	14	8
Migrated with all dependants	78	41	75	88	84	88	84	60	82
Total	100	100	100	100	100	100	100	100	100
n	886	95	981	1,234	68	1,302	2,238	174	2,412

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992- 1993.

a Includes couples with no dependants.

Nature of migration

Family migration, that is, migrant heads of households moving with all their dependants, has been an important feature of internal migration in the earlier migration studies in Fiji, and it continues to be an important factor. The majority of the migrant heads of households among all ethnic groups and gender groups migrated with some or all of their dependants (**table 11**). However, a slightly higher proportion of Indo-Fijians and “other” ethnic groups than Fijians migrated with all their dependants. Fijians were twice as likely to migrate alone when compared with Indo-Fijians. There is a significant gender difference in the nature of migration. Women migrant heads of households were three times more likely to migrate alone than men heads of households.

Among the never-married, 70 per cent of men and 58 per cent of the women heads of households migrated alone (**table 12**). The migration of never-married women household heads is significant as it indicates a growing pressure on them to seek employment in order to realize social and economic benefits; it also may show that they desire to free themselves from socio-cultural constraints and for older women to seek familial support during their old age. Both Fijian and Indo-Fijian women experienced this pressure to migrate for survival.

The majority of the migrant heads of households migrated with some or all of their dependants. However, in some cases, other people, relatives as well as non-relatives, migrated with the heads of households as well. Of the 2,403

Table 12. Sex, marital status and the nature of migration of the heads of households, 1992-1993

(percentage)

Nature of migration	Males				Females			
	Never married	Married	Divorced, separated or widowed	Total males	Never married	Married	Divorced, separated or widowed	Total females
Alone	70	5	13	9	58	22	13	25
Migrated with some dependants	14	7	4	7	21	20	8	14
Migrated with a dependant	16	88	84	84	21	58	79	60
Total	100	100	100	100	100	100	100	100
n	114	2,099	25	2,238	38	50	86	174

Source: Computed from the data analysis of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

migrant heads of households, about 13 per cent (320 cases) indicated that persons other than their dependants migrated with them (table not shown). Of these, 56 per cent of the migrant heads indicated that one non-dependent person migrated with them, 28 per cent indicated that two people migrated with them and 17 per cent said that three to seven non-dependent persons migrated with them. Fijians represented the largest group having persons other than their dependants with them (69 per cent). Such persons included relatives and non-relatives. This migration of non-dependents with the migrant heads of households indicates the wider socio-cultural and economic aspects of living arrangements and living styles for kinship members who also migrated with the heads of households. It is well known that Fijians tend to have extended families and are more likely than Indo-Fijians to have relatives and non-relatives staying in the household⁵

Migrants at their destinations

Employment and training

The majority of the migrant heads of households secured jobs within one to six months of their arrival at the place of destination (**table 13**). Indo-Fijians found jobs slightly more quickly than Fijians. The rapidity with which the migrant heads of households were absorbed into the labour market is indicative of job availability at their destinations. However, it is also quite likely that arrangements for employment were made prior to movement.

Table 13. Ethnicity and time taken to acquire employment by migrant heads of households, 1992-1993

Ethnic groups	(percentage)				n
	Less than 1 month	Within 1 to 6 months	6 to more than 12 months	%	
Fijians	59.4	32.8	7.8	100	128
Indo-Fijians	62.6	29.0	8.4	100	214
Others	61.5	38.5	0.0	100	13
All ethnic groups	61.4	30.7	7.9	100	355

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992- 1993.

These findings fully endorse the view that migration is a powerful mechanism for social and economic improvement, and that job opportunities do exist in migrant destinations, acting as a powerful magnet for rural populations.

Living conditions of migrants

Migrants need housing when they relocate to other areas. Generally, arrangements for housing are done prior to the actual departure of migrants. This is to be expected as most migrant heads of households moved as a consequence of job transfer and it is likely that arrangements for housing were also made before migration. Those who migrated for job transfer in the civil service or in the private sector are more likely to have government, institutional and subsidized housing from employers. The data (not shown) indicate the slight increase in tenure of government, institutional or subsidized housing. **Table 14** shows that 62 per cent of the migrant heads of households acquired independent dwellings, while approximately one third rented rooms.

Table 14. Living arrangements of migrants by ethnicity, 1992-1993

Type of dwelling and living arrangements	(percentage)			
	Fijian	Indo-Fijians	Others	Total (all ethnic groups)
Independent dwelling	63.3	60.5	64.3	61.9
Rented rooms	24.3	30.1	23.3	27.4
Paying guest/living with relatives and friends	3.7	3.7	3.9	3.7
Other	8.7	5.7	8.5	7.1
Total	100	100	100	100
n	979	1,299	129	2,407

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

Table 15. Employment status of migrant heads of households before and after migration by ethnicity, 1992-1993

Employment status	(percentage)						Percentage point change for total
	Before migration			After migration			
	Fijians	Indo-Fijians	Total	Fijians	Indo-Fijians	Total	
Wage earner	29	51	41	33	51	43	2
Salary earner	50	26	37	53	26	38	1
Employer	0	1	1	0	1	1	0
Self employed	13	15	14	10	15	13	-1
Unpaid family community worker	1	1	1	1	1	1	0
Unemployed	2	2	2	1	2	2	0
Not economically active	5	4	5	2	2	3	-2
Total	100	100	100	100	100	100	
n	975	1,302	642	980	1,302	2,410	

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

Consequences of migration

This section examines the impact that migration had on the social and economic conditions as reported by migrant heads of households and their dependants at their destinations. The micro-level perspective on the impact of migration is wholly explained from the migrants' view, irrespective of objective economic forces such as inflation, salary and wage conditions.

Economic conditions

This section provides economic data on factors such as employment and occupational status, income of household heads, total income of households before and after migration. Ethnic and gender comparisons are also made in relation to income and employment status. The employment status of migrant heads of households indicates a positive marginal change relating to salary and wage earners. While there were no changes in the wage and salary component of the Indo-Fijians after migration, there was a small positive change for the Fijian component (**table 15**). However, there was no change in the state of unemployed heads of households after migration.

After migration, professional, technical and related occupational groups, and sales personnel showed a slight growth in employment, with Fijians improving their share of professional and related work after migration (**table 16**). In agriculture-related work, the proportion of migrant heads of households who were employed in agriculture decreased, with Indo-Fijians experiencing

Table 16. The main occupations of migrant heads of households before and after migration, 1992-1993

Occupations	(percentage)						Percentage point change for total
	Before migration			After migration			
	Fijians	Indo-Fijians	Total ^a	Fijians	Indo-Fijians	Total ^a	
Professional/technical/related	26	15	20	30	15	22	2
Administrative/managerial	8	2	5	7	3	5	0
Clerical/related	7	7	7	6	7	7	0
Sales	2		5	3	9	7	2
services	19		12	19	8	13	1
Agricultural/related	18	8	23	13	20	17	4
Production	17	7	25	4	4	4	-21
Not classified	3	4	4	5	8	7	3
Total	100	100	100	100	100	100	
n	900	1220	2120	952	1,232	2,301	

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

a Total population includes all ethnic groups.

much of this decrease. Rural-based farming activities suffered a loss of people owing to land-lease problems, the stagnant market for agricultural products and general unemployment in the rural areas. Migrant heads of households' choice of production-related occupations (such as work as labourers, and in transport and production) decreased substantially across all ethnic groups.

The gross income of the household heads and the gross income of the households, pooled by all participating members, increased as well. There were gender and ethnic dimensions to the changes in the gross income of the migrant heads of households (**table 17**). Women migrant heads of households in the F\$7,000-9,999 (US\$1= F\$2.28) income bracket realized a slight increase in their income while those in the F\$0-2,999 bracket suffered a decrease after migration. This reflects the positive impact of migration. Increases in the income of the household heads occurred mainly among those who were earning over F\$5,000 and males were more advantaged than females after migration, as a slightly higher proportion of them earned over F\$5,000 than did females.

Both Fijian and Indo-Fijian household heads increased their gross income slightly after migration (**table 18**). Even though the increase was small (3-4 per cent), it was considered significant enough to attract the migrants to move from one place to another. Further, the gross income from all activities contributing

Table 17. Gross annual income of migrant heads of households by sex, before and after migration, 1992-1993

Income level(F\$)	(percentage)						
	Before migration			After migration			Percentage point change for total
	Males	Females	Total	Males	Females	Total	
0-2999	28	49	29	21	44	22.1	-6.7
3,000-4,999	25	15	24	24	16	23.5	-0.9
5,000-6,999	19	11	18	21	11	20.3	2.1
7,000-9,999	15	14	15	18	18	17.6	2.4
10,000-14,999	8	8	8	11	8	10.5	2.2
15,000-19,999	3	2	3	4	3	3.8	0.6
20,000+	2	1	2	2	0	2.2	0.3
Total	100	100	99	101	100	100	
n	2,188	136	2,324	2208	154	2,362	

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

to the household also increased, particularly for households earning more than F\$5,000. Both Indo-Fijians and Fijians experienced similar levels of positive changes in their gross income for the household (**table 19**).

The economic consequences of migration provide unambiguous support for the notion that migration in Fiji is economically beneficial for migrants. The number of household members earning income increased (those with three earners more than doubling after migration). The number of people in higher income brackets increased consistently for those earning F\$5000 or more gross income from all economic activities.

Social conditions

The housing conditions of the migrant heads of households changed marginally as a result of migration. There were slight decreases in the proportion of migrant heads of households who lived as squatters and in other housing arrangements. There was an increase in free or subsidized housing from employers, government and institutional housing, and rental and individual homes (**table 20**). Ethnicity and the type of housing tenure show an important change. The proportion of Indo-Fijians living in their own house increased slightly after migration. In contrast, the Fijian component experienced significant changes as a higher proportion of them had government quarters, subsidized/free housing from their employer or from the Housing Authority (a statutory organization providing housing for low-income earners) when compared with the tenure type before migration.

Table 18. Gross annual income of migrant heads of households by ethnicity before and after migration, 1992-1993

Income level (F\$)	(percentage)						Percentage point change total
	Before migration			After migration			
	Fijians	Indo-Fijians	Total population ^a	Fijians	Indo-Fijians	Total population ^a	
0-2999	24	34	29	16	28	22	-7
3,000-4,999	22	26	24	21	26	24	0
5,000-6,000	21	16	18	24	17	20	2
7,000-9,999	19	13	15	21	15	18	3
10,000-14,999	9	7	8	12	9	11	3
15,000-19,999	4	3	3	4	4	4	1
20,000+	2	2	2	2	1	2	0
Total	101	101	100	100	100	101	
n	936	1,265	2,324	969	1269	2,362	

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992- 1993.

^a Total population includes all ethnic groups.

Migrant household heads were also able to acquire larger living areas after migration; more households lived in three- and four-room houses than previously (data not shown). This situation also reflects the larger household sizes, particularly among Fijians, where both relatives and non-relatives stayed with the migrant heads of households (as discussed previously).

Also after migration, slightly more people attended schools and colleges, perhaps reflecting factors such as the age structure of the migrant families and the improved conditions of migrant heads of households. Furthermore, the slight gains in salaries and wages may have made attendance at these institutions more affordable.

General perceptions of social and economic conditions after migration

In the previous section, the changes in the socio-economic conditions of the migrants were examined objectively through a number of variables; in this section, the perceptions of migrant heads of households — a very important variable in the migration process — are discussed.

Table 21 indicates that the vast majority of the migrant heads of households perceived that they had improved their employment and working conditions, income, and the social and cultural aspects of their lives. These perceptions reflect the interplay of various socio-economic factors, especially

Table 19. Gross annual household income from all economic activities, by ethnic group, before and after migration, 1992-1993

Gross annual income level from all sources (F\$) ^a	(Percentage)						Percentage Point change total ^b
	Before migration			After migration			
	Fijians	Indo-Fijians	Total population ^b	Fijians	Indo-Fijians	Total population	
0-2999	19	30	25	12	22	17	-8
3,000-4,999	20	25	23	17	24	21	-2
5,000-6,999	19	16	18	21	17	19	1
7,000-9,999	17	12	14	20	14	17	3
10,000-14,999	13	8	10	14	11	12	2
15,000-19,999	7	5	6	8	6	7	1
20,000+	4	4	4	7	5	6	2
Total	99	100	100	99	99	99	
n	943	1,287	2,355	977	1,293	2,398	

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992- 1993.

a Gross income includes income from all economic activities by the members of the household.

b Total population includes all ethnic groups.

those of their previous place of residence, which the migrant heads of households used to judge their current place of residence and their associated benefits once migration had occurred. There were no differences in gender and ethnic perceptions of social and economic improvements after migration (data not shown). The majority of male and female migrant heads of households indicated that they enjoyed better social and economic conditions after migration. The majority of respondents from all ethnic groups indicated that they felt their social and economic conditions had improved after migration.

Overall, the overwhelming majority of migrant heads of households, irrespective of sex and ethnicity, felt very positive about migration, even though the data indicate that the benefits were marginal, especially in relation to income, employment, education and housing conditions. These very positive perceptions perhaps indicate that higher wages and salary are not necessarily the major criteria for their perception of socio-economic improvements. More significant may be other factors such as having access to electricity and water, being in closer proximity to hospitals and schools, being closer to relatives and family members for social and physical security (especially after the coups d'etat) and other social and cultural benefits.

Table 20. Ethnicity and type of house tenure migrants had before and after migration, 1992-1993

Type of tenure	(Percentage)						Percentage Point change total
	Before migration			After migration			
	Fijians	Indo-Fijians	Total population	Fijians	Indo-Fijians	Total population	
Own house	35	45	41	31	49	41	0.4
Rent from private landlord	18	23	21	18	25	22	1.0
Rent from Housing Authority	3	2	2	7	2	4	1.6
Government/Institutional house	24	9	15	27	9	17	1.4
Free/subsidized housing from employer	11	9	10	14	11	12	2.1
Squatter	0	4	3	0	0	0	-2.3
Other	9	8	8	3	4	4	-4.3
Total	100	100	100	100	100	100	
n	978	1,303	2,410	980	1,302	2,411	

Source: Computed from data of the Migration Module of the Fiji Employment and Unemployment Survey, 1992-1993.

Because human behaviour involves the interplay of people's perceptions, among many other influences, these perceptions are important, as migrants behave according to them. Quite clearly, the results show that migrants felt that they had improved their social and economic position after migration. This positive perception is likely to fuel further migration.

Conclusions and policy implications

Internal migration in Fiji during the five years prior to the 1992-1993 survey was a dynamic process. Rural-to-urban migration and more importantly inter-urban migration have been most pronounced, indicating the dominance of urban Suva. However, rural-to-rural and urban-to-rural migrants cannot be overlooked, because they showed that location of jobs and other attractions did not deter people from moving into these areas. Generally, marital status and education level were significant factors influencing the decision to migrate. Educated and trained people migrated more than others for job transfers and related needs. Among the varied reasons for migration, the most important were job transfer and "other" reasons. For Fijian heads of households, job transfer was more important than "other" reasons, while the opposite held true for Indo-Fijians. This outcome reflected the labourmarket situation during the five years prior to the survey. The rapid and continued emigration of skilled

Table 21. General perceptions of social and economic conditions of migrant heads of households before and after migration, 1992-1993

Social and economic conditions	Percentage
Employment and working conditions better after migration	85.3
Social and cultural life better after migration	85.0
Income better after migration	81.4
n	2,416

Source: Computed from data of migration module of the Fiji Employment and Unemployment Survey 1992-1993.

and professional Indo-Fijians created a skilled labour vacuum in key areas of the professional, trade, production and other sectors. The vacuum was filled by the transfer of skilled people, most notably Fijian and “other” migrants.

Gender is important in migration. Independent migration of women emerged during this period, especially among those who are educated and more motivated to achieve economic independence and gain freedom from socio-cultural constraints. Young never-married Fijian women were much more mobile than Indo-Fijian women. Older Indo-Fijian women who were widowed, divorced and separated were found to be more mobile than younger Indo-Fijian women. Also, it is significant to note that Fijian females who had a higher education had greater representation among the heads of households than Indo-Fijian and “other” ethnic groups. These young, highly educated, single Fijian women comprised the bulk of the single woman heads of households migrating. Nonetheless, family migration still remains the dominant type of migration. The patriarchal nature of the society and the importance of family values and family life are reflected in the migration of families, although the evidence of the migration of independent, educated women is a positive feature indicating a greater degree of freedom of movement, especially among Fijian women.

The social and economic conditions indicate that there were only marginal changes in various social and economic indicators after migration. However, migrant heads of households felt that employment, income and the social and cultural lifestyles were significantly better after migration, and there were no ethnic and gender differences in this perception. One of the most important findings of this study is that there is a wide gulf between any objective measure of change in the well-being of people before and after migration and the perception of the migrants themselves. This leads one to question variables often included in these measurements, as migrants probably

place high pressure on improvements for future rather than purely current indicators. In any case, since the perceptions of people guide their behaviour, this study points to the importance of studying migrant perceptions more in the future in order to understand migration dynamics.

Internal migration and more specifically rural-to-urban migration and urban-to-urban migration will continue to remain a strong and dynamic force in Fiji because, from the migrant's perspective, there are gains to be made from migration. Migration is perceived to improve one's income and lifestyle. In view of the fact that most survey respondents were located in urban areas, especially in Suva and its peri-urban areas, and that in 1996, 47 per cent of the total population of Fiji lived in urban areas, there are growing concerns about the potential for an increasingly large urban population in the future. Rural-to-urban migration by Indo-Fijians will also be fueled by the expiry of agricultural land leases and the consequent increase in landlessness among farmers. There is growing fear among Indo-Fijians living in rural areas that are predominantly Fijian. These fears have been heightened as a result of the May 2000 coup d'état in Fiji and the resulting racial tension and violence suffered by isolated Indo-Fijian settlements in rural provinces. Efforts to minimize this problem in rural settlements and villages and to seek better race relations could minimize the tendency of Indo-Fijian farmers to vacate farmland in order to reside in urban areas. Rural development programmes and plans must be approached with human development and human rights issues in mind in order to instill a sense of security of living in rural places and consequently to curb the flow of rural people to urban areas in the future. In addition, agricultural land-lease problems deserve urgent and non-political attention, within the spirit of goodwill and commitment by all those concerned — the State, farmers, millers and landowners. Indo-Fijian farmers who lease native land have no access to any other land; unless solutions to this problem are found, urban places will face an influx of people from rural areas in the future. The rural population will continue to remain in rural areas only if the income disparities between rural and urban centres decrease, and the rural population can look forward to a better infrastructure (such as electricity, roads and water supply) and better health and education services.

While high population concentrations may be valuable for business and industry in situations where there is high economic growth, such concentrations may prove to be a setback in a stagnant economy that faces high unemployment. Fiji has low economic growth, limited investor confidence and problems of political instability, especially after three coups d'état in the past 15 years. Job losses have been significant as a result of these crises. In

addition, urban places are already experiencing pressure on their urban resources and facilities. Poor housing, erratic water supply, disruptions to electricity supply, poor road conditions, limited job opportunities and rising unemployment are some of the problems already experienced by the urban population, especially in Suva. These are and will remain important considerations for the urban population and they need to be factored explicitly into development planning in general and urban planning in particular.

Endnotes

1. The expiry of agricultural leases and landlessness among Indo-Fijians in rural areas are likely to precipitate rural-to-urban migration as families and relatives move to urban areas either to squat or seek shelter with relatives. By 2001, 2,932 agricultural leases had expired (Reddy and others, 2001) and no provision was made to accommodate the expiry of leases and the resettlement of Indo-Fijian farmers.
2. The data analysis indicated that almost all migrants were living at their current place of residence for the last five years after migrating from their previous place of residence. This aspect shows the recent nature of migration in Fiji.
3. Other reasons were not coded in the migration schedule data. This category includes a diverse set of reasons otherwise not included in the categories of the variables.
4. Fijians represented nearly two thirds of the civil service in 1996. Following the military coups of 1987, the share of Indo-Fijians in the civil service shrank by nearly 50 per cent owing to resignation and emigration (Kumar, 1997:87).
5. Among the Fijian population in 1996, 57 per cent of the households were the extended type in rural areas and 65 per cent of the households were the extended type in urban areas (Bureau of Statistics, 1999a).

References

- Bakker, M.L. (1999). *Internal Migration in Fiji: A Study of the Level, Direction and Characteristics of Inter-provincial Migration Based on Census Data*, Research Monograph No. 1 of the 1996 Census of Population and Housing, (Suva, Government of Fiji).
- Bureau of Statistics (1989). *Report on Fiji Population Census 1986, Analytical Report on the Demographic, Social and Economic Characteristics of the Population*, (Suva, Government of Fiji).
- _____ (1999a). 1996 *Fiji Census of Population and Housing: General Tables*, Parliamentary Paper No. 43 of 1998, (Suva, Government of Fiji).
- _____ (1999b). 1996 *Fiji Census of Population and Housing, Analytical Report, Part I: Demographic Characteristics*, Parliamentary Paper No. 49 of 1998, (Suva, Government of Fiji).
- Chandra, R. (1981). "Rural-urban population movement in Fiji 1966-1976: a macro analysis", in G.W Jones and H.V. Richter (eds.), *Population Mobility and Development: Southeast Asia and the Pacific*, Monograph No. 27, (Canberra, National Centre for Development Studies, Australian National University).

- _____ (1997). Asia Pacific Migration Research Network (APMRN) Issue Papers from Fiji, Migration Issues in the Asia Pacific Working Paper Series No.1, UNESCO/Programme Management of Social Transformations, (Wollongong, Australia, APMRN).
- _____ and D.W. Chandra (1998). "Internal population mobility", in R. Chandra and K. Mason (eds.), *An Atlas of Fiji*, (Suva, Department of Geography, University of the South Pacific).
- Chetty, N.K. and S. Prasad (1993). *Fiji's Emigration: An Examination of Contemporary Trends and Issues*, Demographic Report No.4, (Suva, Population Studies Programme, University of the South Pacific).
- Kumar. S. (1997). "Institutionalized discrimination in Fiji", in G. Chand and V. Naidu (eds.), *Fiji: Coups, Crisis and Reconciliation*, (Suva, Fiji Institute of Applied Studies).
- Perera, P.D.A. (1993). "Migration and its implications for socio-economic development policies", in Fourth Asian and Pacific Population Conference, Bali, Indonesia, 19-27 August 1992, Selected Papers, Asian Population Studies Series No. 124, (New York, United Nations).
- Reddy. M., P. La1 and H. Lim-Applegate (2001). "ALTA or NLTA: What's in the Name? Land Tenure Dilemma and the Fiji Sugar Industry", Working Paper No. 46, (Madison, Land Tenure Center, University of Wisconsin).
- Skeldon, R. (1992). "The relationship between migration and development in the ESCAP region", in *Migration and Urbanization in Asia and Pacific: Interrelationships with Socio-economic Development and Evolving Policy Issues*, Selected Papers of the Pre-conference Seminar of the Fourth Asian and Pacific Population Conference, Seoul, 21-25 January 1992. Asian Population Studies Series No. 111, (New York, United Nations).
- _____ (1997). "Rural-to-urban migration and its implications for poverty alleviation", *Asia-Pacific Population Journal*, 12(1):3- 16.
- Thadani, V. and M. Todaro (1984). "Female migration: a conceptual framework", in *Women in the Cities of Asia: Migration and Urban Adaptation*, J.T. Fawcett, S.E. Khoo and P.C. Smith (eds.), (Boulder, Colorado, Westview Press).
- Todaro, M.P. (1989). *Economic Development in the Third World*, fourth ed., (London and New York, Longman).
- _____ (1994). *Economic Development* (New York, Longman).
- Walsh, A.C. (1982). *Migration, Urbanization and Development in South Pacific Countries*, Country Reports No.6, (New York, United Nations).
- Young, E. (1994) "Internal migration" in D. Lucas and P. Meyer (eds.) *Beginning Population Studies*, second edition, (Canberra, National Centre for Development Studies, Australian National University).