

# **Burden of Stroke Among Fiji's Older Persons**

**Jagdish C. Maharaj, FAFRM (RACP)\* and Sela V. Panapasa, PhD\*\***

**Paper presented  
2002 IUSSP Regional Population Conference  
Siam City Hotel  
Bangkok, Thailand  
June 10 – June 12, 2002**

---

\* Dr. Jagdish Maharaj, DSM, MPH, MMed, FAFRM (RACP), is a Consultant in Rehabilitation Medicine at the National Rehabilitation Medicine Hospital, Ministry of Health. Suva, Fiji.

\*\* Dr. Sela Panapasa, PhD, is a Research Fellow with the Population Studies Center, Institute for Social Research at the University of Michigan, Ann Arbor, Michigan USA.

Acknowledgement: The authors wish to express their sincere thanks to Dr Jona Senilagakali, President of CounterStroke Fiji for allowing the use of the Stroke Register for this study, the Field Workers and Sr. Marseu Kaituu for their valuable assistance. Dr. James W. McNally for his assistance with data preparation and advice on imputing missing information.

**Abstract**

Over the years, Fiji has managed to contain most infectious diseases through its very successful immunisation program, improved hygiene and living conditions, and safe water supply. Non-communicable diseases have emerged with their resultant chronic and disabling effects. The gradual ageing of the population has also contributed to an emergence of chronic and disabling conditions related to the ageing process. There is a high prevalence of chronic disability, largely caused by preventable diseases found among persons of working age and in the young old (60-74 years). Data collected by the Ministry of Health show a rising incidence of stroke in the past 4 decades. Recent work has confirmed that a high proportion of the elderly admitted to general medical wards with disorders of cerebrovascular, cardiovascular and respiratory conditions had a high prevalence of co-morbidities.

This study examines the stroke as an emerging health problem for the older population of Fiji. The data selected for this study was from the population-based CounterStroke Register for 1991-2001. Analysis was conducted to determine distribution patterns among stroke victims and projections calculated for the next 30 years. This analysis provides useful information for comparison with other less developed countries and a guide for developing preventive measures, health education and promotion programs on stroke in Fiji and among other Pacific Island countries. The results from this study will be used to improve health care service delivery for stroke victims and stimulate further research on population and health issues in the Pacific.

***Key words: Population, Stroke, Older Persons, Disease burden, Fiji Islands.***

## Introduction

Over the years, Fiji has managed to contain most infectious diseases through its successful immunisation program, improved hygiene and living conditions, and safe water supply. With improvements in overall health status and increased longevity, chronic non-communicable diseases have emerged as a primary cause for long term disability. The gradual ageing of the population is contributing to an emergence of chronic and disabling conditions related to the ageing process. There is a high prevalence of chronic disability, largely preventable diseases in persons of working age and in the young old (60-74 years). According to data collected by the Fiji Ministry of Health the incidence of stroke has been rising during the past 4 decades.

This paper examines new data on stroke victims in Fiji to provide insightful information on an emerging health threat in the Pacific. The findings from this analysis will be used to develop preventive measures, health education and promotion programs on stroke in Fiji and other Pacific Island countries. This study will also help stimulate further research on population and health issues in the Pacific and encourage comparative analysis within the region.

## Literature Review

Stroke is a leading cause of death and most survivors experience severe cognitive and physical disabilities that require ongoing rehabilitation and support (Lee, Huber, and Stason 1996). The overall incidence of stroke worldwide is around 2 to 2.5 per thousand population and the socio-economic impact is considerable with an estimate of 4.5 million deaths a year from stroke in the world and over 9 million survivors (Wolfe 2000). Stroke represents an expensive condition requiring about US\$17 billion annually to care for stroke patients, from initial hospitalization through to rehabilitation and long-term care in the United States (Matcher and Duncan 1994).

The stroke incidence and prevalence vary among different populations, geographical regions and ethnic groups and a downward trend has been observed in developed countries. The WHO MONICA Project (Thorvaldsen *et al.* 1995) that provided a cross-sectional and longitudinal comparisons of stroke epidemiology in many populations showed more than threefold differences in stroke mortality rates among populations. The age-standardised stroke incidence rates per 100,000 varied from 101 to 285 in men and from 47 to 198 in women with incidence rates being very high among the population of Finnish men tested. The incidence of stroke was, in general, higher among populations in Eastern than in Western Europe. It was also relatively high in the Chinese population studied, particularly among women.

Heng *et al.* (2000) of the Clinical Trials and Epidemiology Research Unit, National Medical Research Council of Singapore in a cross-sectional surveys showed that male Chinese and Indians had higher incidence than Malays, however, in females, Malays had the highest incidence of stroke, being 2.57 times (95% CI 1.31, 5.05; P = 0.008) more likely to get stroke than Chinese after adjustment for age.

The burden of the level of impairment and disability among stroke victims also varies. Lawrence *et al.* (2001) estimated the prevalence of acute impairments and disability in a multiethnic population of South London Stroke Register to identify differences in impairment and early disability and reported that Blacks had higher age- and sex-adjusted rates of disability in ischemic stroke but impairment rates were similar to those of Whites.

Over the years Fiji has managed to contain most infectious diseases through its very successful immunisation program. Ongoing improvements in public hygiene, living conditions and water supply have limited the kinds of acute epidemic diseases that plague many developing nations. Still this success has come at the cost of increased rates of chronic non-communicable diseases with their resultant disabling effects. According to Ministry of Health Report (1993) there is a very high prevalence of chronic disability in Fiji, largely preventable diseases in persons of working age and among the young old (60-74 years). Data collected by the Ministry of Health show a rising incidence of stroke in the past 4 decades. Recent work has confirmed that a high proportion of the elderly admitted to general medical wards with disorders of cerebrovascular, cardiovascular and respiratory conditions had a high prevalence of co-morbidity's (Maharaj and Ehrlich 1999) and that the trend towards an earlier onset of disability was evident in the Fiji population (Panapasa, forthcoming).

## **Background on Fiji**

The nation of Fiji is composed of over 300 islands located in the Western apex of the Polynesian Triangle of the South Pacific. As of the 1996 Census it had a total population of 775,077 individuals. Ethnically, the nation primarily consists of indigenous Fijians and Indo-Fijians together comprising over 95 per cent of the total population. The remainder of the population is made up of Polynesians, Asians, Europeans and those of mixed race. The Indian population was introduced in Fiji from 1889 onward as indentured labours during the British Colonial Era. The vast majority of Indians in Fiji are native born and most represent third or more generations of Fijian citizenship.

While small in population size by Western standards, Fiji represents one of the largest non-European nations in the Pacific and plays an important role as a leader in the advocacy and political development of indigenously governed nations in the Pacific Basin. While its total land mass is limited to approximately 18,000 square kilometres it controls more than a million (1,290,00) square kilometres of ocean. Control of fishing rights over this area alone represents a major economic resource to the Fijian people. The development of mineral and oil resources within its territorial waters has only recently been recognised as a potential option for the Fijian economy and is largely unexplored. While Western nations are reducing their overall investment in Fiji and the Pacific Basin, Japanese, Korean and Chinese investment has increased sharply in recognition of the potential value of the unexploited resources under Fijian control.

### **The Elderly in Fiji**

As is the case in many developing countries the proportion of the population 60 years and older in Fiji represents a seemingly small number. As of the 1986 Census of population only 5.3 per cent of all Fijians were aged 60 years or older and only 3.6 per cent of all Indians were aged 60 years or older. Nonetheless, Fiji's population is ageing, and quite rapidly. The median age among Fijians has risen from 17.8 in 1966 to 20.1 by 1996 and among Indians the median age has risen from 15.2 in 1966 to 19.4 by 1996. For the Fijian population as a whole, the median age has risen from 16.5 in 1966 to 21.2 in 1996 (Fiji Island Bureau of Statistics 1989; 2000).

The percentage of those 65 and older to children under 15 years of age has risen as well, from 6.4 per cent in 1966 to 9.1 per cent among Fijians by 1996. Among Indians it had risen from 3.7 per cent in 1966 to 10.3 per cent in 1996 and among the population as a whole it rose from 5.1 per cent to 8.8 per cent during that 30 year interval. While small compared to the larger base of arguably pre-labour force children, the size of the elderly population has increased in Fiji over the past two decades and we can expect further increase through time.

Figure 1 presents the change in the absolute number of elderly Fijians and Indians 60 years and older from 1966 to 1996. There has been a dramatic increase in the number of elderly individuals over time in Fiji. The size of this growth is especially marked among those 60 to 64 years of age with an almost doubling of the population in that age group during the interval. Those individuals aged 65 to 69 for both Fijians and Indians more than doubled in size during the interval, as did the size of the Fijian population 70 to 74 years of age between the years 1966 and 1996. Of greatest interest is the growth of the number of oldest old (75 years and older) among both Fijians and Indians. If the observed rate of growth between 1966 and 1996 persists, this represents a potential doubling of this oldest old group every 5 years for Fijians and every 7 years for Indians.

This rapid growth of elderly in a population which is already attempting to care for a large population of young individuals represents a serious policy concern in a country faced with scarce economic resources and a limited labour market. Within families, a growing pool of elderly represent a growing series of choices that have to be made over who gets access to what resources. Does the family pay the school fees for the child or the pharmacist for the elder's blood pressure medicine? These are real day to day decisions that are made at the family level daily as the government has not as yet given serious considerations to an infrastructure that supports or even minimally supplements the needs of an underrecognised but growing elderly population (Barr 1990).

As is common throughout the developing world, Fiji has no social safety net for the elderly. It lacks a developed social security system, while retirement plans and pensions are rare. Regardless of the desirability of such arrangements, the elderly invariably live with their children or other family members in Fiji. Independent living is an extremely rare event and over 65 per cent of both Fijian and Indian elderly live in households containing three or more generations (Plange 1987; Panapasa and McNally 1997). Only about 10 per cent of the elderly live in single generation households, and only slightly more

live in households that contain only two generations (Panapasa and McNally 2000).

The picture this finding presents is one of the majority of elderly living, not only with their children, but with their grandchildren as well. With the mean wage in Fiji currently at approximately US\$8 a day (Fijian Bureau of Statistics 1995), this type of family structure represents choices and potentially fierce competition for limited economic resources. The wage earning members of the family have a newly emerging social responsibility to invest in their children as well as a long standing social responsibility to care for their parents and, in many case, for other elderly kin as well. These two responsibilities invariably result in conflict when resources are limited while needs is increasing (Panapasa and McNally 2000).

The overall of health among the elderly in Fiji represents the missing information in the potential conflict over limited resources. The level of illness and chronic impairment among the elderly represent a direct cost to the family, as the elderly have no alternative for care when they can no longer maintain an autonomous lifestyle. While a healthy elder can sacrifice many nonessential needs or desires for the good of the family, an unhealthy elder may not be able to make these choices and sacrifices. Chronically impaired elderly may make demands upon family resources that severely strain their ability to maintain an acceptable standard of living. The longer an elderly member of the family can remain unimpaired the longer they represent a potential asset to the family but when autonomy is lost they could represent a serious burden to that same family (Panapasa and McNally 1997).

## Data and Method

This study examines stroke as an emerging health problem among the older population of Fiji. The data for this study draws on population-based stroke case register maintained by the CounterStroke Fiji Project<sup>1</sup> for a period between 1991 and 2001. These data were collected from hospital records throughout the country as well as at the community level. The registry includes basic demographic, social and health information on individuals suffering from a stroke. Total sample size is 1,175 cases of which majority (77 per cent) had a first stroke only compared to 23 per cent with two or more strokes.

In order to minimise the loss of information due to item nonresponse, imputation techniques were used to correct for missing data on selected variables. Missing data points were repaired using a variation of a “nearest neighbour” hotdeck using the median value of responses from  $k$  randomly selected cases with related characteristics. The use of a randomised hotdeck approach helps minimise the tendency towards central values as encountered with more simplistic approaches such as *mean value* imputation. The nearest neighbour approach also increases the variation across imputed values so measure of significance are not unduly inflated (Ford 1980). The repaired data set provides consistent estimates for the entire 1,175 stroke cases reported in the registry across the 11 year period.

---

<sup>1</sup> CounterStroke Fiji is a non-governmental organization established in 1989 with the main aim of tracing all stroke victims, conducting social rehabilitation and promoting stroke prevention.

To illustrate the nature and magnitude of stroke in Fiji, descriptive analysis is used to compare individuals with first and multiple strokes. Stroke rates are then calculated for 1996 and applied to the 1996 Fiji Census to compute survival rates. Finally, the number of strokes for Fiji is projected for the next 30 years.

## Results and Discussion

### *Bivariate Analysis*

Table 1 provides bivariate analysis of stroke individuals recorded during the past decade. The incidence of stroke increases dramatically with age regardless of the number of occurrences and is prevalent among individual's ages 50 and older. Individuals with first stroke more than doubled from 12 per cent between ages 40 and 49 to 27 per cent between ages 50 and 59, peaking at 30 per cent for ages 60 to 69 before declining to 18 per cent and lower among individuals 70 and older. Among individuals with multiple strokes, the incidence of having two or more strokes also increases dramatically from 9 per cent at ages 40 to 49 to 34 per cent for ages 50 to 59 before declining to 31 per cent between ages 60 and 69 and less than 18 per cent among the oldest old (age 70 and older).

While there are no real gender differences with males and females almost evenly divided in the incidence of having one or more strokes, variations do exist between the major ethnic groups with Fijians representing the highest proportion with at least one stroke compared to Indians and other racial groups. Among individuals with first stroke, 51 per cent were Fijians compared to 41 per cent Indians and less than 10 per cent belonging to other groups. Among individuals with 2 or more strokes, 49 per cent were Fijians compared to 44 per cent Indian and 7 per cent belonging to other races. According to the results for associated medical condition or risk factors when the incidence of stroke occurred, hypertension was most prevalent with 81 per cent of individuals with first stroke having hypertension compared to 53 per cent for individuals with multiple strokes. Diabetes was also relatively high with 27 per cent of first stroke individuals having diabetes compared to 16 per cent among individuals with multiple strokes. Over 90 per cent of stroke victims with diabetes also had hypertension, that is, had two risk factors. Among individuals with stroke, less than 10 per cent had heart condition and even fewer suffered from "other" medical conditions. Interestingly, 16 per cent of the total individuals with first stroke had no associated preconditions compared to a striking 43 per cent with multiple strokes did have one or more pre-existing medical risk factors.

Comparisons of the hemispheric involvement of brain damage between first stroke and multiple strokes, major differences are found among individuals with two or more strokes with 24 per cent of damages occurring in the left hemisphere of the brain compared to 45 per cent in the right hemisphere.

Interestingly, family support for individuals with stroke is unprecedented and becomes worse especially among those with two or more strokes. Among individuals with first stroke, 52 per cent received family support while 48 per cent did not receive any family support. Striking differences exist for individuals with multiple strokes with 35 per cent receiving family support compared to 65

per cent indicating not receiving any family support. These results contradict expectations toward care and support of the elderly especially if disability from having one or more strokes occur.

Table 2 presents bivariate results for year and place of residence by district of the stroke victim in Fiji. Majority of the strokes recorded by the CounterStroke Register occurred between 1990 and 1999 at 74 per cent. These results may reflect the timing of when the CounterStroke as an organization was established and the lack of data availability on stroke victims in the country prior to the 1990s. According to results on the location most stroke victims mainly reside in the major cities and towns of Viti Levu compared to rural areas and outer islands. The largest proportion of stroke victims resided in Suva with 47 per cent being first stroke compared to 34 per cent with two or more strokes. Other cities and towns with relatively high proportions of first stroke victims are Nadi and Sigatoka at 10 per cent followed by Lautoka (9 per cent) and Nausori (8 per cent), with fewer than 5 per cent in most areas of the country. Interestingly, a much higher proportion of victims with multiple strokes reside in cities and towns outside Suva. For instance, 17 per cent of multiple stroke victims reside in Lautoka followed by 15 per cent in Sigatoka and 8 per cent in Nadi with even fewer residing in other areas. The high concentration of stroke victims in urban areas may reflect the need to be closer to hospital services and other medical treatment centres. This also suggests that urban residents are at higher risk of stroke given the stresses of urban living but are better able to obtain treatment compared to rural residents who are isolated and most likely to die before receiving treatment.

### Life Table Estimates

Life table estimates were generated for 1996 using the reported stroke incidence and population data from the 1996 Census. While the stroke registry is treated as representing complete coverage, it is recognized that the underreporting of strokes is likely. Consequently, we treat the resulting estimates as conservative measures of the prevalence of stroke in the population.

Figure 2 presents the failure rate for entry into stroke for the Fiji population as of 1996. The failure rate of a life table is merely the inverse of the survival rate (Formula 1), so if 98% of the population in a specific age group did not have a stroke the failure rate is 2%. As strokes remain rare among all age groups in Fiji it is intuitively more instructive to discuss the failure or entry into stroke.

$$\text{Formula 1: } S(t_i) = \prod_{j=1}^i (1-d_j/n_j)$$

Figure 2 reflects the low overall risk of stroke among the population as of 1996. Among those aged 90 and older the failure rate is only 2.5 per cent and this risk represents a negatively monotonic relationship with age. This is consistent with our understanding of the increased risk of stroke across the ageing life course. The relatively low overall risk of stroke does not minimise the potential cost of the impairment to society. As stroke typically represents the entry into a lifetime of chronic disability, ongoing medical care, rehabilitation and economic support are all required. As the bivariate analysis suggests that

there is a high risk that stroke victims will lack family support, the care and maintenance of stroke victims will increasingly represent an economic burden to social and public health care services.

This burden is expected to increase with the accelerated ageing of the Fijian population. As more people survive to older ages, the prevalence of strokes will also increase even if the overall risk of stroke remains stable across time. Table 3 and Figure 3 reflect this trend towards higher stroke prevalence across time. To generate these estimates we first projected the Fiji population from 2000 to 2030. The failure rates generated for 1996 were then applied to these population projections, generating prevalence estimates for the number of stroke victims by age-groups from 2000 to 2030. According to Figure 3 it can be seen that the number of strokes increases each decade for all ages, but the greatest increases are seen among the oldest old. Even with the most conservative estimates, the rapid growth in the size of the oldest old increases the estimated number of strokes from 16 strokes among those 80 and older to 463 strokes by 2030. Overall, this represents a doubling of the total prevalence of strokes across all ages between 1996 and 2000, with a 50% increase in strokes for each decade between 2000 and 2030. In terms of total prevalence across time, the number of strokes is projected to have an almost 8.5 fold increase from 271 strokes in 1996 to almost 2,300 strokes as of 2030. This rapid increase represents a significant additional burden to families, medical and health care services and social support networks that are already straining to meet current demand.

## **Conclusion**

This study has reports on the increasing trend and social burden of stroke in Fiji. Projections of existing patterns suggest that the pace and prevalence of stroke will only increase for the foreseeable future. As a chronically disabling condition, the victims of strokes represent unique economic and health care burdens to individuals, caregivers, families, health care system and the national support services. Without significant policy foresight, the economic costs of stroke will be felt keenly as Fiji enters the early part of the 21<sup>st</sup> century. Similarly, an ongoing lack of adequate rehabilitative care facilities and minimal governmental support for caregivers will exacerbate the inherent challenges of caring for stroke victims. The finding that family support is available for only about half of all stroke victims is particularly telling as it suggests that increases in stroke prevalence may also result in higher levels of abandonment of the elderly and significant increases in demand for non-traditional support services for these chronically impaired individuals. Neither governmental nor non-governmental agencies are currently prepared for the additional economic and health care costs associated with such a scenario, so proactive policy development is clearly in order.

A concerted effort now to seek declines in the projected rate of stroke in the population and to seek improvements in the health outcomes of patients will have positive implications for the costs of future care. Coordinated policy attention to the issues raised in this paper is both timely and economically feasible, as the problem remains somewhat manageable. The need for improvements in diagnosis, early intervention, proper care and rehabilitation are

crucial, however, due to the rapidly ageing population of Fiji. This ageing of the population is already contributing to the emergence of chronic and disabling conditions often correlated with stroke, diabetes and hypertension. As the Fiji population continues to age, the prevalence of stroke will increase as well as the natural physiological declining function of ageing and increase in co-morbidities. Consequently, there is a clear need for policy implementation for the elderly that includes medical and health care training with a Gerontological and Geriatric Medicine focus.

This study represents a major step toward the need for information on issues of population and health in the Pacific and provides useful information that can be used comparatively with similar information from other less developed countries. The results represent baseline information that can be used in the development of preventive measures, health education and promotion programs on stroke in Fiji and other Pacific Island countries. As we are hopeful that the health care service delivery for stroke victims will be further improved, we will continue to develop and refine the preliminary observations that this study reports so informed policy can emerge. Clearly, there is a need for further research on emerging health threats and population changes in the Pacific. Health registries such as the CounterStroke Fiji Project represent an invaluable tool in the better understanding of emerging health problem in the Pacific and the development of guided policy to address our health needs in the 21<sup>st</sup> Century.

## Bibliography

- Barr, K.J. (1990) Poverty in Fiji. Fiji Forum for Justice, Peace and the Integrity of Creation.
- Fiji Island Bureau of Statistics. (1989) 1986 Fiji Census of Population and Housing-General Tables. Fiji Government. Suva.
- (1995) Statistical Brief.
- (2000) 1996 Fiji Census of Population and Housing-General Tables. Fiji Government. Suva.
- Ford, B. (1980) An Overview of Hot-Deck Procedures. In: Incomplete Data in Sample Surveys Vol 2. William G. Madow, Ingram Olkin and Donald B. Rubin ed. Academic Press. New York. pp: 185-206.
- Heng, D.M., Lee, J., Chew, S.K., Tan, B.Y., Hughes, K. and Chia, K.S. (2000) 'Incidence of ischaemic heart disease and stroke in Chinese, Malays and Indians in Singapore: Singapore Cardiovascular Cohort Study'. Annals of the Academy of Medicine, Singapore, 29(2), 231-6.
- Lawrence, E.S., Coshall, C., Dundas, R., Stewart, J., Rudd, A.G., Howard, R. and Wolfe, C.D. (2001) 'Estimates of the prevalence of acute stroke impairments and disability in a multiethnic population'. Stroke, 32(6), 1279-84.
- Lee, J.A., Huber, J. and Stason, W.B. (1996) 'Poststroke rehabilitation in older Americans: The Medicare experience'. Medical Care, 34, 811-825.
- Maharaj, J.C., and Ehrlich, F. (1999) 'Elderly persons admitted to general medical wards in Fiji'. BOLD Quarterly Journal of the International Institute on Ageing (United Nations), 10(1), 17-26.
- Matcher, D.B. and Duncan, P.W. (1994) 'Cost of stroke'. Stroke Clinical Update, 5, 9-12.
- Ministry of Health. (1993) 'National Health Policy for the Elderly in Fiji'. A report prepared by World Health Organisation Short-term Consultant, 1993, Suva, Fiji.
- Panapasa, S. and McNally, J. (1997) From Cradle to Grave: Health Expectancy and Family Support Among the Elderly in the Fiji Islands. Brown University Working Paper. WP97-10. August.
- (2000) Sociable Security: Family Support and Elderly Well-Being in Fiji: 1966-1986. Unpublished doctoral dissertation. Brown University. Providence, Rhode Island.
- Panapasa, S. (Forthcoming) 'Disability Among Older Women and Men in Fiji: Concerns for the Future'. Journal on Women and Aging. Vol 14, Summer Issue 14(1/2), 2002.
- Plange, Nii-K. (1987) "Aspects of Ageing in Fiji." Fiji Ageing Research Report Sponsored by the World Health Organization.

Thorvaldsen, P., Asplund, K., Kuulasmaa, K., Rajakangas, A. and Schroll, M.  
(1995) 'Stroke Incidence, Case Fatality, and Mortality in the WHO  
MONICA' Stroke, 26(3), 361-367.

Wolfe, C.D. (2000) 'The impact of stroke'. Br Med Bull, 56(2), 275-286.

**Table 1: Bivariate analysis of stroke victims in Fiji: 1991-2001**  
**Demographic and Medical characteristics**

	<b>First stroke only</b>	<b>2 or more strokes</b>
<b>No. of cases</b>	909	266
<b>Age</b>		
Under 30	1.7%	1.5%
30-39	4.5%	3.4%
40-49	11.9%	9.4%
50-59	27.0%	33.8%
60-69	30.3%	31.2%
70-79	17.7%	17.7%
80+	7.0%	3.0%
	100%	100%
<b>Sex</b>		
Female	49.4%	49.2%
Male	50.6%	50.8%
	100%	100%
<b>Ethnicity</b>		
Fijian	50.6%	48.9%
Indian	41.3%	43.6%
Other	8.1%	7.5%
	100%	100%
<b>Associated medical condition</b>		
Hypertension	80.5%	53.0%
Diabetes	27.2%	16.2%
Heart condition	6.4%	7.5%
Other medical condition	3.4%	3.8%
None precondition	15.8%	43.2%
<b>Hemisphere involved</b>		
Right	49.5%	45.1%
Left	50.5%	54.5%
Bilateral	--	0.4%
	100%	100%
<b>Family support</b>		
Yes	52.3%	35.3%
No	47.7%	64.7%
	100%	100%

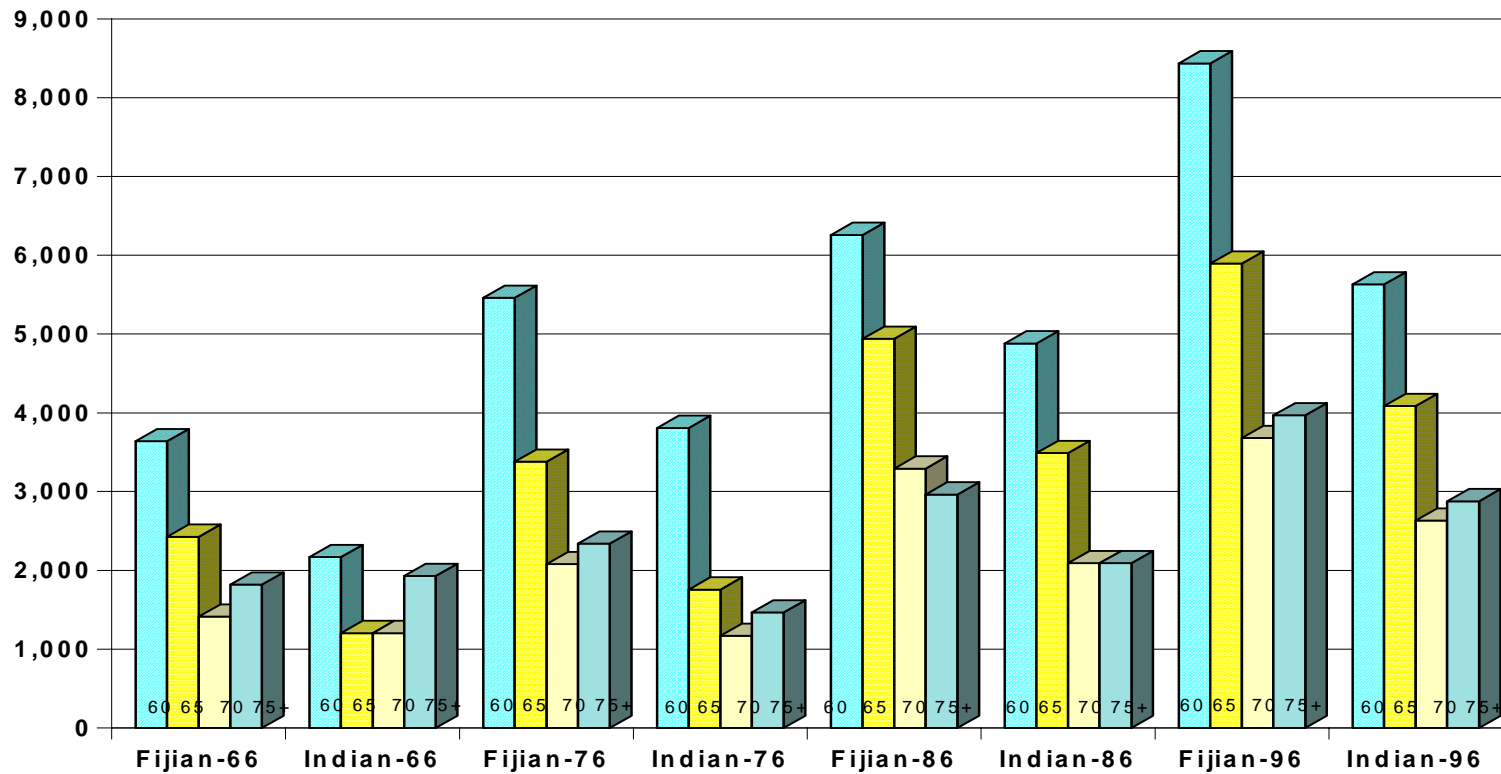
**Table 2: Bivariate analysis of stroke patients in Fiji: 1991-2001  
Timing and Location**

	<b>First stroke only</b>	<b>2 or more strokes</b>
<b>Year of stroke</b>		
Prior to 1979	0.3%	0.4%
1980-1989	4.1%	4.9%
1990-1999	74.3%	83.1%
2000-2001	21.3%	11.7%
	100%	100%
<b>Location by district</b>		
Ba	1.2%	2.6%
Bau	0.2%	--
Bua	0.9%	1.1%
Kadavu	0.4%	0.8%
Labasa	2.2%	3.8%
Lau	0.2%	0.8%
Lautoka	9.2%	16.5%
Levuka	1.2%	3.0%
Nadi	10.5%	8.3%
Naitasiri	0.1%	--
Nausori	8.3%	1.5%
Navua	1.2%	5.6%
Ra	1.3%	1.1%
Rabi	0.1%	0.4%
Rotuma	0.2%	--
Savusavu	0.1%	--
Sigatoka	10.0%	15.4%
Suva	47.1%	33.8%
Tailevu	4.8%	4.1%
Taveuni	0.4%	0.8%
Tavua	0.2%	0.4%
	100%	100%

---

**Table 3: Projected number of strokes: Fiji, 1996 to 2030**

<b>Age</b>	<b>1996</b>	<b>2000</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>
<b>25-29</b>	2	2	3	4	4
<b>30-34</b>	5	8	10	12	15
<b>35-39</b>	10	15	20	26	33
<b>40-44</b>	12	19	26	33	43
<b>45-49</b>	18	30	44	58	77
<b>50-54</b>	31	57	83	119	155
<b>55-59</b>	44	86	129	195	263
<b>60-64</b>	43	89	139	215	317
<b>65-69</b>	37	78	130	208	332
<b>70-74</b>	30	61	109	189	314
<b>75-79</b>	22	43	78	153	271
<b>80-Up</b>	16	61	110	241	463
<b>Total</b>	<b>271</b>	<b>549</b>	<b>881</b>	<b>1454</b>	<b>2287</b>



**Figure 1: Population growth among elderly individuals 60 years and older: Fiji, 1966 to 1996**

