

# Oral Health Status of Older Adults in Fiji: 1985-1999

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**Abstract:** This paper examines the oral health status of older adults in Fiji to determine the risks of dental disabilities. Using cross-sectional data collected in 1985 and 1999, logistic regression models are used to measure the effect of select demographic, socioeconomic and health variables on difficulty with chewing. While the general picture for the older persons is quite positive, the largest concern is the striking increase in poverty as a predictor for our dependent variable. (PHD, 2003; 10 (1), Pages 28-34)

## Introduction

Like many developing countries, Fiji has a rapidly ageing population facing increased prevalence of chronic and disabling conditions related to the ageing process. These sudden changes raise concern on a variety of issues including oral health and dental services for older people. Similarly as the risk for oral disease is expected to increase with longevity, it is unclear whether the needs of the older persons can be met by the existing medical and social system.

The purpose of this paper is to examine the oral health status of older adults in Fiji and to describe the demographic profiles of the aged population at risk of dental disabilities. Using nationally representative surveys fielded in 1985 and 1999, our diagnostic variable is based on whether the respondent reports "difficulty with chewing".<sup>a</sup> This question is typically used in major ageing surveys to provide comparative measures of overall prevalence cross-nationally. From a planning perspective, the study discusses medical and support services that may be needed to support other older individuals in Fiji. The study also describes policy implications for oral health among seniors.

## Background

The preservation of good oral health in old age is important towards the maintenance of adequate nutrition, good overall health and self-esteem in later years. As oral health has direct and indirect effects on the quality of life of elders, the growth of this demographic age group has profound implications on oral health services.

Prior research reported that with population ageing, most dental practices experience growth in the percentage of older people being served.<sup>1,2</sup> Simultaneously, there are other "hidden" issues typically facing older patients that can adversely impact on dental treatment. These barriers include both financial and social concerns,<sup>3</sup> and the presence of other medical problems such as arthritis and hypertension that can "crowd out" dental care.<sup>4,5</sup> Factors that influence the decision to seek dental care include age, education, family size, income, presence of teeth, race and insurance status.<sup>6,7</sup> Consequently, the lack of adequate dental treatment whether in the form of preventative care and/or assistive devices such as dentures affects a person's ability to chew and restrict their dietary options. This entails a diet weak in proteins

and lightly cooked vegetables, and too many soft foods rich in sugar and carbohydrate.<sup>8,9,10</sup> Similarly, the loss of teeth and/or poorly fitting dentures can make it difficult for older people to speak clearly, hence leading to isolation and depression.<sup>11</sup>

The proportion of the population 60 years and older in Fiji represents a seemingly small number. Nonetheless, as the currently large young cohort age, the need for geriatric medical attention, financial and social support typically presumed by the family is expected to increase quite rapidly. In 1996 the total Fiji population was enumerated at 775,077 of which 51 percent represent Fijians and 44 percent Indians. Among individuals age 60 and older there were 21,981 Fijians and 15,238 Indian.<sup>12,13</sup>

Recent studies on the health conditions of the aged have found that the prevalence for multiple co-morbidities<sup>14</sup> that contribute to an accelerated trend towards the earlier onset of disability, particularly women<sup>15</sup> is steadily increasing. A national oral health survey conducted in Fiji between 1985 and 1986 reported that periodontal disease was a major public health problem.<sup>16</sup> While their findings suggested that the prevalence of caries was generally low, the most commonly affected areas were pit and fissure surfaces of teeth. Comparison with survey results from 1948 and 1965 showed that the prevalence had fallen in primary teeth but remained relatively constant in permanent teeth, therefore affecting adults more than the young. A more recent study<sup>17</sup> demonstrated a perceived inability to obtain dentures due to cost, raising concern about their oral health, and related worries about adequate nutrition and overall health.

To meet a recognized lack of properly trained oral health professionals in the Pacific, an innovative sequential modular training curriculum was introduced for education at the Fiji School of Medicine in 1993.<sup>18,19</sup> This curriculum is a problem-based five-year multi-stage course. Degrees are staggered to allow care providers the opportunity to exit as a dental hygienist after two years, dental therapist or dental technologist after three years and dental surgeon after five years. Oral health professionals can, in theory, return for more advanced training and degrees at later dates and assure an ongoing supply of this key group of health professionals for the Pacific.

In terms of clinical decision-making for treatments of older adults,<sup>20</sup> suggest that attention to patient concerns and

needs in the domains of function, symptoms, pathology, and esthetics are the central elements of the process. Reporting on the concept of turning ageing patients into "customers for life",<sup>21</sup> suggests that respect and awareness to the needs of older patients become an important consideration among dental office staff. As this approach helps patients feel welcome in a practice and represent an effective marketing strategy for older patients.

## Methods

Our data come from the Fiji module of the 1985 WHO Four Country Collaborative Study on Social and Health Aspects of Ageing, and the Project on Health Care and Well-being of the Elderly administered in 1999. The surveys employed stratified cluster sampling focusing on senior's age 60 and older and provide comparable data on demographic, socio-economic and health information on Fijians and Indians. The sample size was 642 cases in 1985 compared to 535 cases in 1999 and the pooled model is 1,177 cases. Comparable measures from the cross-sectional data for older respondents were used to examine the effects of select independent variables: age, gender, ethnicity, overall health, economic status and locality on our dependent variable: difficulty with chewing. We fit four logistic regression models for difficulty with chewing. The first two models examine independent effects for 1985 and 1999. Model 3 is a pooled reduced model to measure change over time. Finally, we constructed a full Model 4 using interaction terms. By comparing the coefficients obtained from these various logistic models, we observe the oral health status among the aged as explained by the difficulty with chewing.

Table 1 presents a descriptive analysis of the total older respondents at risk of difficulty with chewing. The variables are stratified by their mean, standard deviation and range. *Difficulty with chewing* is represented by a dummy variable that equals 1 if the respondent self-reports they have difficulty in chewing and 0 otherwise. Analysis not shown here has found that this difficulty is due primarily to missing teeth, but a lack of adequate dental care and the inability to afford dentures also contribute to this problem. Among the few with dentures, often times they don't fit properly and the older person would rather eat without them. *Age* is employed in the analysis model as a series of dummy variables grouped into 5-year categories except for ages 80 and older. Poor oral health is expected to increase with age due to the increased risk of missing teeth and the associated costs for treatment that seniors are unable to afford. *Gender* is coded as a dummy variable, with Males equal to 1 and Females equal to 0. Because gender differences in access to resources and social capital are extensively documented in the research literature on health, we introduced this variable to examine whether similar associations can be derived for oral health. *Race* is also represented in our model as a dummy variable with indigenous Fijian equal 1 and Indians equal 0. Fijians

and Indians represent different cultures, dietary habits and lifestyle experiences within Fiji, controlling for ethnicity is expected to yield a fuller understanding of differences in oral health outcomes.

The perceived overall health of the respondent is also included in the model as oral health and general health are interrelated on numerous levels. Using questions from the two surveys on self-assessed health, our health variable is coded 1 if the respondent reports they are healthy and 0 otherwise. Healthy respondents are expected to have lower levels of difficulty with chewing and presumably would be better able to function and access resources to facilitate good oral health. As economic status impacts on a person's ability to obtain a variety of health resources including dental care, we include a measure of financial stability in our model. The dummy variable Poor is coded 1 if the economic circumstances of the respondent are insufficient to meet their needs and coded 0 otherwise. In general it is assumed that a poor respondent is less likely to receive proper dental treatment and maintain a regular oral hygiene routine. Prior studies have

found marked differences in health outcomes between individuals living in urban as opposed to rural areas.<sup>18, 22, 23</sup> *Urban Residents* were coded 1 and rural residents were coded 0. We expect that, on one hand, rural residents will have poor oral health compared to urban residents. While urban dwellers often have more unhealthy dietary behaviors due to easier access to sugars and processed foods,<sup>24</sup> we suggest that this is offset by the concentration of dental clinics and the availability of information on oral health in urban areas.

## Results

Table 2 presents results from our four logistic regressions on the probabilities of having difficulty with chewing in 1985 and 1999 when respondents were 60 years or older. The coefficients for each year reflect effects of each variable, holding all others constant. The intercepts for 1985 and 1999 are constructed for difficulty with chewing. Table 3 replicates these findings, but presents the log odds of the logistic coefficients to aid in the interpretation of the findings so Table 3 will be employed in the discussion that follows.

### Oral health in Fiji as of 1985

According to the results in column 1 for the 1985 sample, most of our control variables represent significant predictors of difficulty with chewing. While in general the risk of having difficulty with chewing increases with age, as expected the effects are largely insignificant and suggest that oral health problems start young and have become relatively uniform in the population by the time people reach old age. Similarly, we find no significant gender differences in the risk of difficulty in chewing again suggesting uniformity in oral health problems for both men and women. This finding is reasonable as men and women in most households share similar diets and is

### Reporting on the concept of turning ageing patients into "customers for life",<sup>21</sup> suggests that respect and awareness to the needs of older patients become an important consideration among dental office staff.

expected to have similar experiences in terms of dental care.

**Table 1: Descriptive Statistics of Older Respondents: 1985 and 1999**

Variable	Mean	Std. Dev.	Min.	Max.	Description
<b>1985</b>					
Badchew	.60	.49	0	1	Difficulty chewing=1, No difficulty chewing=0
Age	69.52	7.24	60	98	Recode age into 5 year categories except 80+
Gender	.54	.50	0	1	Male=1, Female=0
Race	.64	.48	0	1	Fijian=1, Indian=0
Healthy	.58	.49	0	1	Feel quite healthy=1 Unhealthy=0
Poor	.57	.49	0	1	Not enough money=1 Enough/Comfortable=0
Urban	.37	.48	0	1	Urban residence=1 Rural residence=0
<b>1999</b>					
Badchew	.50	.50	0	0	Difficulty chewing=1, No difficulty chewing=0
Age	69.06	7.11	60	100	Recode age into 5 year categories except 80+
Gender	.49	.50	0	1	Male=1, Female=0
Race	.56	.50	0	1	Fijian=1, Indian=0
Healthy	.66	.47	0	1	Feel quite healthy=1 Unhealthy=0
Poor	.24	.43	0	1	Not enough money=1 Enough/Comfortable=0
Urban	.45	.50	0	1	Urban residence=1 Rural residence=0

Note: No. of cases: 1985 = 642; 1999 = 535.

**Table 2: Logistic coefficients for Regression of Difficulty with Chewing On Selected Independent Variables: Fiji 1985, 1999**

Variables	1985	1999	1985-1999 Pooled Beta	1985-1999 Interactions Beta
Intercept	.03 (.24)	-1.34*** (.37)	-.57* (.26)	-1.34** (.36)
<b>Age</b>				
65-69	.14 (.22)	.12 (.23)	.14 (.16)	.13 (.16)
70-74	.50* (.25)	.42 (.27)	.47*** (.18)	.42* (.26)
75-79	-.01 (.29)	.66* (.33)	.33* (.21)	.67** (.32)
80+	.40 (.30)	.36 (.36)	.44* (.23)	.37 (.35)
Male	-.07 (.17)	-.03 (.19)	-.05 (.12)	-.03 (.19)
Fijian	.92*** (.20)	.41* (.19)	.64*** (.13)	.41** (.19)
Healthy	-.44* (.18)	-.58** (.20)	-.52*** (.13)	-.58*** (.20)
Poor	.08 (.19)	.66** (.23)	.51*** (.14)	.66*** (.23)
Urban	-.37* (.18)	-.75*** (.19)	-.18* (.13)	-.75*** (.19)
flag85	—	—	.31* (.20)	1.37*** (.42)
65-70, '85	—	—	—	.07 (.33)
70-74, '85	—	—	—	-.68* (.41)
75-79, '85	—	—	—	.03 (.44)
Age 80+, '85	—	—	—	-.04 (.25)
Male, '85	—	—	—	.51* (.28)
Fijian, '85	—	—	—	.14 (.27)
Healthy, '85	—	—	—	-.58** (.30)
Poor, '85	—	—	—	-1.34*** (.36)
Urban, '85	—	—	—	-1.12*** (.26)
No. of cases	642	535	1,177	1,177

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$  (two-tailed tests)

Note: Numbers in parentheses are standard errors.

Moving beyond age and gender effects, however, we find that our remaining control variables provide significant findings for the risk of poor oral health. As of 1985 there were marked ethnic differences with Fijians being 2.5 times more likely to report difficulty in chewing compared to Indians. This may be driven by dietary practices as Fijians tend to consume more starch and sugar compared to Indians. As expected our measure of overall health was significantly related to oral health and followed the hypothesized direction. As of 1985, healthy seniors were 36 percent less likely to report difficulty in chewing compared to unhealthy seniors. Our variable measuring the impact of impoverishment proved insignificant in this model and this suggests that the uniformly low level of dental care during this period had similar impacts on the poor and non-poor. Our measure of urban/rural residence was significant for 1985 and showed that urban residents were 31 percent less likely to report oral health problems compared to rural residents.

### Oral health in Fiji as of 1999

Our second model presented in column 2 looks at the risks of having difficulty in chewing among the older population as of 1999. As was the case in 1985, age effects in 1999 reflect a pattern of increasing risk of difficulty in chewing as age increases but age effects remained largely insignificant as do gender effects. The risk of having oral health problems remains significantly higher for Fijians in 1999 but the risk attenuated, going from 2.5 times more likely in 1985 to only 51 percent more likely as of 1999. Reporting good overall health remains significant for older adults in 1999 with the healthy being 44 percent less likely to report difficulty in chewing compared to the unhealthy. Unlike 1985, poverty becomes highly significant for the increased risk of having difficulty in chewing among seniors in 1999. By 1999, the impoverished seniors became almost 2 times as likely to report difficulty in chewing when compared to seniors with sufficient economic resources. Similarly, we find an increased benefit for older adults living in urban areas in 1999 compared to 1985. Senior respondents in urban areas were 53 percent less likely to have difficulty in chewing when compared to their rural counterparts.

### Oral health in Fiji using pooled data for 1985 and 1999

While differences across time were seen in the results for 1985 and 1999, we are unable to directly test for the significance of these differences using independent models of prevalence for each period. To systematically examine patterns of change over time in the prevalence of oral health problems in the aged population we combined the two surveys into a single pooled analysis set. Using a stratifying variable the effects in 1985 are coded 1 and the effects in 1999 coded 0, a series of interaction terms were introduced to observe whether differences between the two periods are statistically significant and therefore meaningful.

Column 3 of Tables 2 and 3 present the reduced model for the pooled data analysis. This model contains the same covariates used in the 1985, 1999 independent analysis, and the indicator variable for year of survey

administration. Briefly examining this model we see the covariates remain relatively stable with the age variables assuming statistical significance for the first time, though retaining their original direction and rank order. Gender remains insignificant as expected and the variables for health, poverty status and urban residence retain stability in their significance, direction and log odds of risk. The central variable of interest in the reduced model is the year of administration indicator variable—*flag 85*. This variable indicates whether the gross change observed between 1985 and 1999 is statistically meaningful or simply an artifact of sampling variability. According to the result of the variable in the reduced model, it is significant and in the expected direction. As expected from the concentrated effort to improve dental care between the 1980's and 1990's, the indicator variable shows that the overall reported oral health of older adults was 36 percent worse between 1985 and 1999. This represents a marked improvement in the general health of the senior population and justifies a more detailed analysis for the effects of change.

Our fourth model presented in Column 4 is the full interactive model. This model allows us to measure the level of change across time in the risks associated with difficulty in chewing based upon our independent variable. We summarize the additive observed changes in log odds for our model in Figure 1 for ease of presentation. In Figure 1, age effects are generally mixed. Older adults ages 65 to 69 and ages 75 to 79 show the expected pattern of declining risk for difficulty in chewing between 1985 and 1999. While seniors aged 80 and older show a slightly increased risk, the differences are not statistically significant and the change in log odds is minimal. The change for aged 70 to 74 in 1985 and 1999 is more difficult to explain. In this age group we see a major shift in risks from being 23 percent less likely to have difficulty in chewing in 1985 to having a 52 percent greater risk of difficulty in 1999. While only the 1999 effect is statistically significant, the change in log odds is dramatic. There may be some unmeasured cohort effect for this age group that we do not presently understand but can investigate in future work.

Changes in the risk of having difficulty in chewing between Fijians and Indians are significantly different for both the 1985 and 1999 effects. While Fijians remain at greater risk than Indians for oral health problems this risk declines from 73 percent greater in 1985 to 51 percent greater by 1999. This may be the result of improved diet among Fijians and increased access to education about dental care and oral hygiene during the interval. Similarly, we see declines in disparities in oral health for both our health variable and urban/rural residence. While both good health and urban residence continue to significantly reduce the odds of having difficulty in chewing in 1985 and 1999, the effects are smaller across time. In 1985, being healthy made an older respondent 69 percent less likely to report difficulty in chewing and living in an urban area reduced this risk by 85 percent. In 1999 however, these odds shifted to 44 percent less likely for the healthy as opposed to the unhealthy and to 53 percent less likely for urban residents as opposed to rural residents. All of

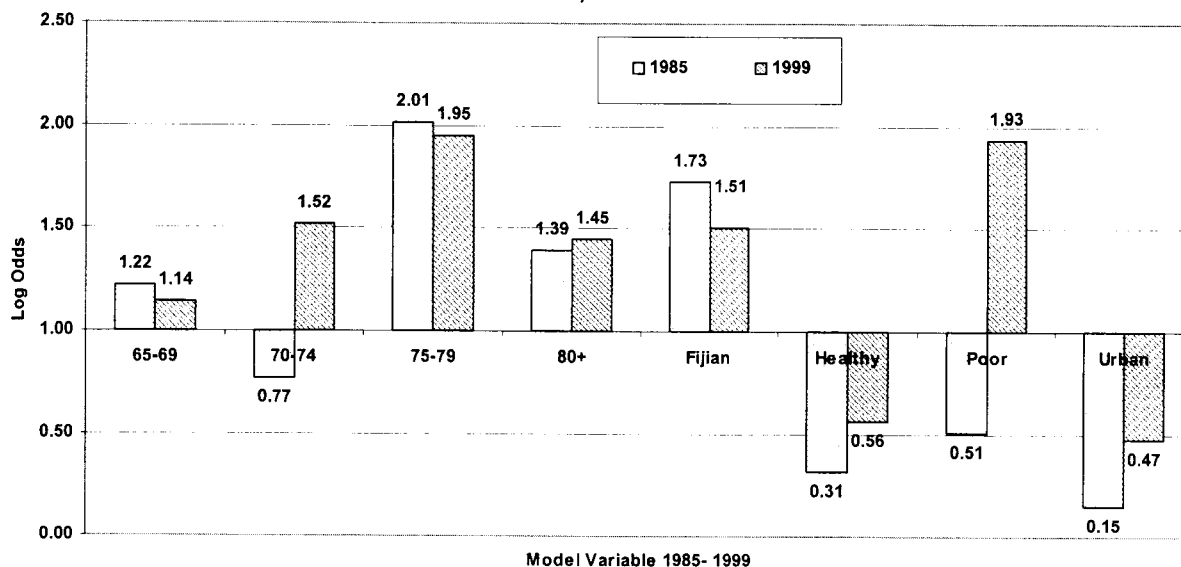
**Table 3: Log Odds for Regression of Difficulty with Chewing on Selected Independent Variables: Fiji 1985, 1999**

Independent Variable	1985 Beta Coefficient	1999 Beta Coefficient	1985-1999 Pooled Beta Coefficient	1985-1999 Interactions Beta Coefficient
Intercept				
<b>Age</b>				
65-69	1.15	1.13	1.15	1.14
70-74	1.65	1.52	1.60	1.52
75-79	.99	1.93	1.39	1.95
80+	1.49	1.43	1.55	1.45
Male	.93	.97	.95	.97
Fijian	2.51	1.51	1.90	1.51
Healthy	.64	.56	.59	.56
Poor	1.08	1.93	1.67	1.93
Urban	0.69	0.47	0.84	0.47
Flag 85	—	—	1.36	3.94
65-70 1985	—	—	—	1.07
70-74 1985	—	—	—	.51
75-79 1985	—	—	—	1.03
Age 80 +1985	—	—	—	.96
Male 1985	—	—	—	1.67
Fijian 1985	—	—	—	1.15
Health 1985	—	—	—	.56
Poverty 1985	—	—	—	.26
Urban 1985	—	—	—	.33

these findings suggest that Fiji's concerted effort to educate the public on oral hygiene and to train and provide dental health specialists has succeeded in measurably reducing a primary disabling oral condition among older adults.

to the non-poor. While poor seniors in 1985 were 51 percent less likely to have difficulty in chewing, by 1999 the situation worsened with poor seniors becoming almost 2 times more likely to report this condition. The result could be attributed to a number of factors. Diet

**Figure 1 - Comparison of Predicted Probabilities for Pooled Model : Older Persons Aged 60 and over, 1985 and 1999**



The one truly troubling result is the finding for poverty. Referring to Figure 1, one of the most powerful shifts between 1985 and 1999 is the tremendous increase in the risk of oral health disease among the poor compared

among the poor is clearly changing in Fiji with the increased ease of access to sugar, preserved products and "junk food". Similarly, the ability of the poor to gain access to good dental care may be limited by income and geographic barriers. Dental care represents costs and

many people; particularly those in rural areas may view it as an unnecessary expense. When funds are limited it may be seen as cheaper and more expedient to have bad teeth removed as needed rather than pay for the lifelong care of the teeth as part of a broader health care strategy.

## Discussions and Conclusions

In general, this paper presents a positive and hopeful outlook for oral health between the aged in Fiji. In the 1980's, the Fiji government recognized it needed to invest in increasing the education, training and number of dental health professionals. The results from this study suggest that this effort has been quite successful in reducing the level of oral health problems among Fijians and Indians aged 60 and older between 1985 and 1999. For almost every measure tested in our analyses we found statistically significant patterns of change that were positively associated with declining risks in reported difficulty in chewing between 1985 and 1999.

**Clearly, with a growing middle class emerging in Fiji, we are also seeing the emergence of class differences that impact a person's access to goods and services associated with health care, medications and good nutrition.**

While the general picture for older adults is quite positive there are concerns that emerge from the analysis. The largest concern is the striking increase in poverty as a predictor for difficulty in chewing. Differences in the effects of income on oral health between 1985 and 1999 suggesting that the poor have largely been left behind and have not reaped the benefits of Fiji's improved levels of oral health. It is assumed that this problem is multifaceted, as the economic and social composition of Fiji has changed in response to development. While the poor once subsisted on simple foods largely grown at home, increasingly the poor in Fiji use store bought food that is inexpensive but often nutritionally inadequate with high sugar content. Changes in diet are seen as having a major impact on declines in oral health among the poor in Fiji, but other factors are at work as well. Clearly, with a growing middle class emerging in Fiji, we are also seeing the emergence of class differences that impact a person's access to goods and services associated with health care, medications and good nutrition. As the ability to afford quality dental care often remains tied to having a cash income, the poor are clearly at risk of being under served. Finally, the poor may face special challenges in terms of education regarding appropriate dental care and oral hygiene. None of these problems are incurable, but the results from this study do argue that we need to take additional steps to help our poor take full advantage of opportunities for good dental care.

In summary, the analysis from this paper shows that the oral health of the older persons in Fiji has improved significantly between 1985 and 1999. It is argued that a major cause for this success has been the concerted effort of the Fiji government to increase and improve the level of dental care nationwide. While some problems remain, in general, measurable strides have been made to improve the quality of life among older adults. The

importance of good oral health for older persons cannot be understated. The ability to chew without discomfort is directly tied to the ability to maintain a nutritionally sound diet. As a good diet is recognized as being central to virtually all other aspects of a healthy life, this analysis argues that older adults have significantly benefited over the past decade. These gains represent the positive outcomes possible when governments implement guided policy with clear and attainable goals aimed at improving the quality of life of its citizens.

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**The ability to chew without discomfort is directly tied to the ability to maintain a nutritionally sound diet.**

The man with toothache thinks everyone happy whose  
teeth are sound  
(G.B. Shaw in *Man and Superman*)