

HIV and AIDS Stigma and Discrimination in China: Results from a National Survey

Because stigmatizing and discriminatory attitudes and tendencies are largely prevalent in China, national and local mass media interventions have an important role to play in making Chinese citizens aware of the debilitating effects of stigma and discrimination and in reinforcing information on HIV/AIDS to reduce baseless fears of transmission.

By Karen Hardee, Benjamin Y. Clark, Victor Yuan, Tim Manchester, Amy Qi, Sarah E.K. Bradley and Zoe Shen*

Worldwide, stigma and discrimination have been identified as tremendous barriers to addressing the HIV/AIDS epidemic, beginning with Jonathan Mann in the 1980s (Mann, 1987), and by others (UNAIDS, 2001, 2008; Reidpath, Brijnath

* Karen Hardee, Population Action International, Washington, D.C.—Formerly of Futures Group International when this work was conducted; Benjamin Y. Clark, Department of Public Administration and Policy, University of Georgia, Athens, Georgia, United States of America, e-mail: benclark@uga.edu; Victor Yuan and Zoe Shen, Horizon Research Consultancy Group, Beijing, China; Tim Manchester, United States Agency for International Development, Dar es Salaam, Tanzania—Formerly of Futures Group International when this work was conducted; Amy Qi, Futures Group International, Beijing; and Sarah E.K. Bradley, Macro International, Washington, D.C.

and Chan, 2005; APN+, 2004). Stigma was defined by Goffman (1963) nearly half a century ago as a discrediting attribute about an individual or group that serves to devalue that person or group in the eyes of the society. More recent theoretical frameworks suggest that stigmatization and discrimination are manifest in a number of contexts, including within families, communities, schools, employment, travel/migration opportunities, health-care settings and HIV/AIDS programmes (Parker and Aggleton, 2002), and in religion and the media (Malcolm and others, 1998). A study in four countries in Asia found pervasive discrimination, with 80 per cent of respondents having experienced AIDS-related discrimination, including nearly one in five facing discrimination within their families and in their workplaces (APN+, 2004). In a review of interventions to reduce HIV/AIDS stigma, Brown, MacIntyre and Trujillo (2003) noted that stigma affects prevention behaviours, test-seeking, care-seeking, quality of care provided to positive clients, and perceptions and treatment of people living with HIV and AIDS by communities and families. Parker and others (2002) contend that HIV/AIDS-related stigma is often layered upon other stigma, for example, the one associated with engaging in illegal behaviour, such as sex work and drug use. Furthermore, families with HIV-positive members often face stigma from the community. In order to combat stigma and the associated discrimination, it is important to understand the knowledge, beliefs and attitudes and how they vary across groups within a country. Such knowledge is critical for designing interventions to reduce stigma and discrimination.

While HIV prevalence in China is still low nationally (less than 0.1 per cent), the country is home to an estimated 840,000 people living with HIV and AIDS (UNAIDS, 2006). In China, HIV and AIDS have long been associated with marginalized groups, including some engaging in illegal behaviour. Of those living with HIV and AIDS in 2005, 44 per cent are injecting drug users and 20 per cent are sex workers and their partners. Eleven per cent acquired HIV through the illegal sale of blood and 7 per cent are men who have sex with men. A further 17 per cent are partners of HIV-infected individuals and members of the general population, while 1 per cent of infections were a result of mother-to-child transmission of HIV (UNAIDS, 2006).

The Government of China was slow in responding to HIV and AIDS (Kaufman and Jing, 2002). The first case of HIV was reported in the 1980s but a national plan was not issued until 2001. Partly as a result of years without national attention drawn to HIV and AIDS, knowledge of HIV is superficial at best and lack of accurate information is common.

Anecdotal evidence suggests that negative attitudes are widespread in China. Gill (2002) noted “widespread social discrimination against HIV and AIDS victims”. Avert.org (2004) found that the pressure from society pushes families to either reject those with HIV and AIDS or to hide their status, even from members of their own family. Rosenthal (2003) reported that until recently, the legal system has not sufficiently protected people living with HIV and AIDS. Reidpath, Brijnath and Chan (2005) in a study of institutional discrimination in six countries in Asia-Pacific, including China, found that discrimination was most prevalent in practice rather than in laws or policies. Suzhou in Jiangsu province became the first province in China to pass a law to protect the rights of people living with HIV and AIDS (PLHA) in 2002 (Agence France Presse, 2002). Based on a large sample survey conducted in 2000, Chen and others (2005) found that community factors such as the level of HIV/AIDS-related risk behaviour and level of development in the community affected people’s perceptions of an acquaintance living with HIV and AIDS.

Research questions

This paper assesses stigma and discrimination using data from a national market research omnibus survey that was conducted among Chinese men and women in 2003. Several questions on HIV and AIDS were added to the national omnibus survey by Futures Group Europe under the China AIDS Prevention and Control Programme, funded by DFID. The questions on AIDS, which included three on stigma and discrimination, were adapted from established research instruments developed under second generation surveillance (FHI and DFID, 2000; WHO, 2008). The analysis measures attitudes related to two distinct groups—how respondents would treat an HIV-positive family member and an HIV-positive co-worker at work—two contexts in which theoretical frameworks note that stigma and discrimination are manifest (Parker and others, 2002). These two contexts are critical to the well-being of PLHA because “the family is the main source of care and support for PLHA in most developing countries” (Parker and others, 2002: p. 8) and access to employment can help ensure that PLHA can have a means of independent financial support. Evidence of stigmatization and discrimination in the workplace abound, both by employers and by fellow employees (Malcolm and others, 1998; Parker and Aggleton, 2002; Pulerwitz and others, 2001; UNAIDS, 2006). Furthermore, these two contexts represent two social realms—within the family and within the broader society. The authors’ primary research questions therefore are:

1. Are there any prevailing attitudes related to people living with HIV and AIDS that are shared throughout the general public in China?
2. Are there differences in the ways people say they would or do treat people living with HIV and AIDS?
3. Are there differences in people's attitudes if the person is a co-worker or a family member?

The paper assesses the effects of age, sex, education, residence, and knowledge of HIV and AIDS on the practice of HIV and AIDS-related stigma and discrimination.¹ The authors hypothesize that those less likely to engage in stigmatizing and discriminating behaviour will be younger, female, urban residents, with higher education and higher levels of knowledge of HIV and AIDS. The authors also hypothesize that women will be less stigmatizing and discriminatory because stigma is related to other social inequalities, including gender (Parker and Aggleton, 2002). Urban residents tend to have a wider range of non-family ties (White and Guest, 2003), which could make them more accepting of others. Higher education also tends to be linked to more progressive and open views. Finally, those with higher level of knowledge on HIV and AIDS should be more likely to understand the modes of transmission and have less fear of transmission through everyday contact with family members and with work colleagues.

Methods

Sample

Data in this paper were collected through a national omnibus survey that encompassed a number of topics. A small set of questions were included on the omnibus survey regarding public opinion on knowledge, attitudes and behaviours related to HIV and AIDS in China.² The national survey was undertaken in 2003, under the auspice of the China-UK HIV Prevention and Care Project, with funding from the United Kingdom Department for International Development (DfID) and managed by Futures Group Europe (now Futures Group International). Horizon Market Research, based in Beijing, collected the data and Futures Group and Horizon Market Research jointly analysed the data.

The full sample comprised 3 968 adult women and men that were included in the market research omnibus survey in seven cities, seven towns, and eight rural regions across China. The cities surveyed were: Beijing, Shanghai, Guangzhou, Wuhan, Chengdu, Shenyang and Xi'an. The rural areas were selected from the

seven towns and one village. The towns include Zhuji (Zhejiang Shaoxing), Changle (Fujian Fuzhou), Beining (Liaoning Jinzhou), Zhuangxinji (Hebei Shijiazhuang), Linxiang (Henan Yueyang), Pengzhou (Sichuan Chengdu), Xingping (Shanxi Xianyang), and one village from Huangpi (Hubei Wuhan). The urban respondents, from cities and towns, ranged in age from 18 to 60 and the rural sample ranged from 16 to 60.³ None of the respondents had left home for long-term study.

In urban areas, the national omnibus survey included a multi-phase random sampling method, first with a neighbourhood committee sample and then with households (Horizon Research Consultancy Group and Futures Group Europe, 2004). If there were no qualified respondents in a target household, another qualified respondent was substituted. If there were more than one qualified respondents in a household, only one was interviewed, in accordance with the Kish sampling method (Kish, 1965). In rural areas, cluster sampling was used. An administrative village was chosen from every town listed above, and then two natural (geographically contiguous) rural areas were chosen from every administrative village. If there was no one in a target household by this sampling method, the interviewers were to try contacting that household every two hours, up to three times. Thereafter, if no one could be reached, a substitute household would be chosen as a replacement. In one household, if there were no qualified respondents, or if respondents refused to answer, a substitute household would be chosen to replace it (Horizon Research Consultancy Group and Futures Group Europe, 2004). Data were weighted to reflect the distribution of the Chinese population in the provinces included in the study.

All observations of individuals that indicated that they had not heard of HIV and AIDS were dropped from the sample. These individuals had not answered any of the questions related to HIV and AIDS and thus were not able to shed any light on the determinants of stigma and discrimination in China.

Model specification

Definition of stigma and discrimination variables

Stigma and discrimination was assessed through the following three questions:

- If a co-worker of yours has HIV but is not sick, should he or she be allowed to continue to work?

- If a member of your family became ill with HIV, the virus that causes AIDS, would you want it to remain secret?
- If a family member of yours became ill with HIV, the virus that causes AIDS, would you be willing to care for him in your household?

Use of Chronbach's Alpha and factor analysis did not support development of an index of stigma and discrimination. Thus, logistic regressions were run using the three stigma and discrimination variables as the dependent variables in separate models to help assess the characteristics that affect stigma and discrimination. The models measure the likelihood of these dependent variables switching from zeros (a "no" response to the questions) to ones (a "yes" response to the questions).

Independent variables:

Age. Age was a continuous variable in the model.

Sex. The sex variable included in the analysis is male, indicating the differences between men and the omitted reference group women.

Residence. Data were collected in three general geographic regions: city, town and rural. The omitted reference group in the analysis was city residence.

Education. Education was represented by four variables in the models and one omitted reference category. The education variables found in the models were: middle school; senior middle school, secondary specialized or technical school; college; and university and above. The reference category for education was the variable indicating only an elementary school-level education.

Knowledge of HIV and AIDS. Knowledge of HIV and AIDS is measured as the number of correct answers to the seven knowledge questions below. Values of the variable ranged from zero to seven.

- Can a person get HIV by sharing a meal with someone who is infected?
- Can people reduce their chance of getting the virus that causes AIDS by not having sex at all?
- Can people reduce their chance of getting the virus that causes AIDS by having just one partner who is not infected and who has no other partners?
- Can people protect themselves from HIV, the virus that causes AIDS, by using a condom correctly every time they have sex?

- Can people reduce their chance of getting the virus that causes AIDS by not sharing needles with other people?
- Can a pregnant woman infected with HIV or AIDS transmit the virus to her unborn child?
- Can a woman with HIV or AIDS transmit the virus to her newborn child through breastfeeding?

Results

Bivariate analysis

Background characteristics

The weighted sample, which reflect the distribution of the Chinese population in the provinces, was evenly split between males (51 per cent) and females (49 per cent), and ranged in age between 18 and 60 (table 1). Of those in the sample, 19 per cent had elementary schooling or below, about 40 per cent had attended middle school, 27 per cent had high school, secondary school or special technical school education, and 14 per cent had a college degree. After weighting to reflect residence, nearly 60 per cent of the sample (58 per cent) were from rural areas, while one quarter (28 per cent) lived in cities and 14 per cent lived in towns.

Table 1. Weighted* descriptive statistics

Categorical variable descriptive statistics	Number	Percentage		
Sex				
Male	1 622	51		
Female	1 568	49		
Residence				
City	899	28		
Town	438	14		
Rural	1 853	58		
Education				
Elementary or below	612	19		
Middle school	1 285	41		
High school, secondary school, specialized technical	841	27		
Associates' degree	254	8		
Bachelors' degree or above	175	6		
Continuous variable descriptive statistics (weighted obs: 3 444)				
	Mean	Std. Dev	Min	Max
Age	37.94	11.80	18	60
Knowledge	3.77	1.82	0	7

* Weights were applied to the data to reflect the distribution of the Chinese population in the provinces.

Knowledge of HIV

Most Chinese people have heard of HIV and AIDS—81 per cent of the entire sample, and 91 per cent of urban residents (not shown in a table). The same percentage of men and women had heard of HIV and AIDS (81 per cent). Young people were more likely than older people to have heard of HIV and AIDS (87 per cent of those aged 26-35 compared with 66 per cent of those aged 56-60). Nearly equal percentages of Chinese (45 and 42 per cent, respectively) noted sexual transmission and blood as the main association they made when thinking about how someone can contract HIV and AIDS, followed by only 3 per cent whose first association was mother-to-child transmission (not shown in a table).

Regarding specific knowledge questions related to transmission and prevention, two thirds of the weighted sample of Chinese residents (66 per cent), knew that one will not be infected with HIV by sharing a meal with an HIV-positive person, while 14 per cent did not know if someone can be infected with HIV through sharing a meal with someone (table 2). Forty per cent of respondents knew that correctly using a condom every time they have sex would protect a person from HIV transmission,⁴ while more than a quarter (28 per cent) said consistent condom use could not protect against HIV infection, 24 per cent were not sure, and 7 per cent did not respond to the question. In all, half of those questioned (50 per cent) said that abstinence can reduce one's chance of getting infected by HIV/AIDS, while nearly a quarter of respondents (23 per cent) did not think so; 21 per cent were not clear about the relationship between abstinence and HIV infection and 5 per cent did not respond. Almost two thirds (60 per cent) of Chinese residents knew that having sex with just one uninfected partner could reduce their chance of getting HIV, 16 per cent thought that doing so could not, 18 per cent did not know, and 6 per cent did not answer. More than three quarters (73 per cent) of respondents knew that not sharing needles with other people would reduce one's chance of contracting HIV/AIDS, 10 per cent said it would not, 14 per cent did not know, and 1 per cent did not answer. Seventy-five per cent knew that an HIV-infected pregnant woman could transmit the virus to her unborn child; 10 per cent said that it could not; 14 per cent did not know; and slightly more than one per cent did not respond. In addition, nearly two thirds (61 per cent) of Chinese knew that HIV/AIDS can be transmitted to a newborn through breastfeeding, 17 per cent said that it could not, 20 per cent did not know, while nearly 2 per cent did not respond. Table 1 shows that respondents had an average knowledge score of 3.77 correct responses (out of a maximum of 7).

Table 2. HIV/AIDS knowledge questions (weighted* responses)

	Can a person get HIV by sharing a meal with someone who is infected?		Can people protect themselves from HIV (the virus that causes AIDS) by using a condom correctly every time they have sex?		Can people reduce their chance of getting the virus that causes AIDS by having just one partner who is not infected and who has no other partners?		Can people reduce their chance of getting the virus that causes AIDS by not sharing needles with other people?		Can a pregnant woman infected with HIV or AIDS transmit the virus to her newborn child through breastfeeding?					
	Obs	Per cent	Obs	Per cent	Obs	Per cent	Obs	Per cent	Obs	Per cent				
Yes	569	17.8	1 272	39.9	1 604	50.3	1 900	59.5	2 340	73.3	2 391	74.9	1 948	61.0
No	2 106	66.0	911	28.5	740	23.2	513	16.1	403	12.6	306	9.6	538	16.9
Don't know	460	14.4	778	24.4	678	21.2	602	18.9	374	11.7	448	14.0	650	20.4
No response	56	1.8	230	7.2	169	5.3	176	5.5	74	2.3	46	1.4	55	1.7
Number of observations	3 191		3 191		3 191		3 191		3 191		3 191		3 191	

* Weights were applied to the data to reflect the distribution of the Chinese population among provinces.

Stigma and discrimination

The level of stigma and discrimination prevailing among people who had heard of HIV and AIDS was measured through three questions, one regarding a co-worker and two associated with family members (table 3). Most people described discriminatory attitudes towards HIV-positive work colleagues—fully 72 per cent said that an HIV-positive co-worker should not be allowed to continue working, compared with 28 per cent who said they should be able to do so.

**Table 3. Indicators of stigma and discrimination
(Weighted* responses)**

	If a co-worker of yours has HIV but is not sick, should he or she be allowed to continue to work?		If a member of your family became ill with HIV, the virus that causes AIDS, would you want it to remain secret?		If a family member of yours became ill with HIV, the virus that causes AIDS, would you be willing to care for him in your household?	
	Obs	Per cent	Obs	Per cent	Obs	Per cent
Yes	729	27.7	1 410	58.4	1 591	65.8
No	1 902	72.3	657	27.2	826	34.2
Don't care			347	14.4		
Don't know	0	0.0	0	0.0	0	0.0
No response	0	0.0	0	0.0	0	0.0
Number of observations (weighted)	2 631 **		2 414		2 417	

* Weights were applied to the data to reflect the distribution of the Chinese population in the provinces.

** The sample used in this table is the one used in the logistic regression shown in table 4.

The response regarding family members indicated that 66 per cent of Chinese said they would be willing to care for a sick family member, while 34 per cent said that they would not. At the same time, 58 per cent of respondents said they would want the HIV status of the family member to remain secret, while 27 per cent said they would not. A total of 14 per cent said that it did not matter in their views.

Multivariate analysis relating background characteristics to stigma and discrimination

The authors ran three multivariate logistic regression models that included age, gender, residence (town, rural, or city), education, and knowledge on HIV as independent variables. In each model, the outcome variable was one of three questions assessing stigma and discrimination.

Tests showed no multiple-collinearity among any of the sets of independent variables. The level of certainty of all significant variables was at least 95 per cent unless otherwise noted. The three models are shown in table 4.

Age: Age was not significant in any of the models.

Sex: The sex of respondent was not significant in any of the models.

Residence: Both town and rural residents are shown to be less likely than the reference group (city residents) to want a co-worker with HIV to be allowed to return to work. Town residents also appeared less willing than city residents to care for a family member with HIV, while both town and rural residents were less likely to be concerned about the status of the family member remaining secret than the city dwellers.

Education: Education appeared to be significant in the model related to caring for a family member infected with HIV but not in the model related to wanting the HIV/AIDS status of their family members remain a secret. In the earlier model, respondents with education above elementary school were generally more likely than those with elementary school or less to say that they would care for a sick family member. Those with senior middle school/secondary specialized/technical schooling are more likely than those with elementary education to be willing to allow HIV-positive people to stay in their workplace.

Knowledge of HIV: The level of HIV/AIDS knowledge does not appear to shape the opinions on any of the three questions posed, as the variable was not significant in any of the models.

**Table 4. Multivariate analysis of factors related to stigma and discrimination in China
(Odds ratios)**

Characteristic	Questions related to stigma and discrimination		
	Respondents agreeing with the statement: <i>A co-worker who has HIV but is not sick SHOULD be allowed to return to work</i>	Respondents agreeing with the statement: <i>If a member of your family became ill with HIV, the virus that causes AIDS, you WOULD you want it to remain secret</i>	Respondents agreeing with the statement: <i>If a family member of yours became ill with HIV, the virus that causes AIDS, you WOULD you be willing to care for him in your household</i>
	Odds ratio	Odds ratio	Odds ratio
Age			
Continuous variable (years)	0.99 (0.98 - 1.00)	0.99 (0.98 - 1.01)	1.00 (0.99 - 1.01)
Sex (reference category: female)			
Male	1.18 (0.93 - 1.50)	0.9 (0.71 - 1.14)	1.18 (0.92 - 1.51)
Residence (Reference category: urban resident)			
Town resident	0.44 (0.35 - 0.55)**	0.39 (0.32 - 0.48)**	0.66 (0.53 - 0.83)**
Rural resident	0.47 (0.35 - 0.63)**	0.53 (0.40 - 0.69)**	0.78 (0.59 - 1.03)
Education (Reference category: elementary school or lower)			
Middle school	1.42 (0.91 - 2.23)	1.3 (0.87 - 1.94)	1.9 (1.29 - 2.82)**
Senior middle school/ secondary specialized/technical	1.65 (1.02 - 2.67)*	1.27 (0.82 - 1.96)	1.45 (0.94 - 2.24)
Some college	1.61 (0.93 - 2.80)	1.46 (0.86 - 2.48)	1.99 (1.16 - 3.40)*
University graduate and higher	1.68 (0.93 - 3.03)	1.15 (0.64 - 2.05)	3.33 (1.74 - 6.36)**
Knowledge of HIV/AIDS score			
Continuous variable (0-7)	1.07 (0.99 - 1.15)	1.07 (1.00 - 1.14)	1.03 (0.96 - 1.11)
Observations	2 763	2 659	2 595
McFadden's R2	0.041	0.029	0.023
McFadden's Adjusted R2	0.035	0.023	0.017

Robust 95 per cent confidence intervals are shown in parentheses.

* indicates significant at 5 per cent; ** significant at 1 per cent.

Discussion

The main finding of this paper is the consistency of generally negative views among the Chinese population regarding people living with HIV and AIDS. The findings of this nationally representative sample of Chinese provide validation of the smaller studies conducted on the topic to date. While this survey of adult Chinese men and women could not explore in depth the issue of stigma and discrimination, a distinction clearly emerged between related to familial relationships and that related to attitudes societal relationship. Similar results were found in an earlier study conducted among sex workers and adult men in Sichuan and Yunnan provinces (Horizon Market Research and Futures Group Europe, 2002a and 2002b).⁵ The low percentages of people indicating that a co-worker should be “allowed” to return to work with a diagnosis of HIV indicates that the Chinese population is not comfortable with the notion of working among HIV-positive colleagues—and that they condone a level of discrimination in the public sphere against people living with HIV and AIDS. The fact that the only statistically significant difference found among respondents regarding their views that an HIV-positive co-worker should not return to work was town residence indicates remarkably consistent (negative) views. A study of AIDS-related discrimination in the workplace in Hong Kong, China, showed similar reluctance to welcome an HIV-positive colleague in the workplace (Lau and Wong, 2001).

The high correlation between the percentages of those who would want to care for a family member and those who would want the HIV status of the family member to remain secret shows a paradoxical view among Chinese residents regarding HIV/AIDS. It is likely that while many people consider it a duty to care for a sick family member, they consider having an HIV-positive family member as shameful and equivalent to ‘loosing face’ in public. It is noteworthy that the most significant differences were found in the models related to family members.

These findings are important for the design and implementation of Chinese HIV and AIDS programmes. This study reinforces the views that HIV-related stigma and discrimination are pervasive among various demographic and residential groups in China. Interventions to reduce stigma and discrimination should be based on these shared norms and public opinion. Because stigmatizing and discriminatory attitudes and tendencies are largely prevalent in China, and because every province in China is home to PLHA, national and local mass media interventions have an important role to play in making Chinese citizens aware of the debilitating effects of stigma and discrimination and in reinforcing information

on HIV/AIDS to reduce baseless fears of transmission from family members and work colleagues (and by extension, students, etc). Politicians and opinion leaders have important roles to play in dispelling myths and changing attitudes. For example, Chinese Premier Wen Jiabao received positive press coverage when he visited the Beijing Ditan Hospital on World AIDS Day in 2003 and became the first senior Chinese government official to shake hands with a person living with HIV/AIDS (Gill, Morrison and Thompson, 2004). More intensive interventions should be directed to the majority of Chinese who live in rural areas, including through mass media, social marketing workplace programmes and interventions to support family caregivers, and enforcement of laws protecting PLHA. The International Labour Organization has recorded successful examples of such workplace programmes (ILO, 2001; ILO, 2008). Given the pervasive views regarding PLHA, China has a unique opportunity to mount a national response to reduce stigmatizing and discriminatory attitudes and behaviour.

Endnotes

1. Authors initially intended to examine the effects of respondents' HIV-related risk behaviour and their perceptions on stigma and discrimination; however small sample sizes associated with those variables prohibited such analysis. Few Chinese (4 per cent) considered themselves at medium or high risk of HIV, which is not surprising given the low national estimate for HIV prevalence. Furthermore, few people (2 per cent) in the sample indicated that they had had multiple partners in the month prior to the survey (although nearly one quarter of the respondents chose not to answer that particular question). Income as an independent variable had also been considered for inclusion; however income ranges for urban and rural areas were so broad that it would have required separate analysis for urban and rural areas. Likewise, authors intended to include occupation in the analysis, but it was not possible to reconcile occupational categories across rural and urban areas.
2. While a survey dedicated to HIV and AIDS could have yielded more in depth information on stigma and discrimination, use of omnibus surveys to collect a small set of information on a topic is a cost-effective way of getting representative findings over large study areas. Such surveys can provide data to validate or complement smaller-scale surveys and in-depth investigations.
3. Eleven respondents from the rural sample aged less than 18 were excluded from the study to align the rural and city samples.
4. This finding is not surprising given China's stringent family planning programme that has never promoted the condom as an effective means of preventing pregnancy.
5. That study also found that a family member with HIV would be perceived differently if the virus was contracted through sex or through blood with the latter more tolerable than the former. The current study was not able to go into such detail regarding stigma and discrimination.

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Women's Empowerment, Sociocultural Contexts, and Reproductive Behaviour in Nepal

This research suggests that studies examining women's empowerment and reproductive behaviour may be enhanced if contextual variables capturing gender development and gender empowerment processes are explicitly included in the models.

By Bina Gubhaju and Stephen A. Matthews*

"Critics of the survey approach to demographic inquiry have urged that greater attention be paid to context in which people make demographic decisions... Large-scale surveys tend to pull the actors out of their dramatic context and place them on an empty stage."

– Ruth Dixon-Mueller (2003, p. 97)

* Bina Gubhaju, Social Policy Research Centre, University of New South Wales, Sydney, Australia, e-mail: b.gubhaju@unsw.edu.au and Stephen A. Matthews, Department of Sociology, Department of Anthropology, and the Population Research Institute, Pennsylvania State University, United States of America, e-mail: matthews@pop.psu.edu

While demography is an inherently spatial science, most practicing demographers have not been encouraged to think spatially, even though demographic behaviour will differ by geographic region (Weeks, 2004). The incorporation of geocodes in large-scale demographic surveys provides new opportunities for research on geographic patterns of behaviour, including reproductive behaviour. In this paper, the authors assume that a woman's reproductive behaviour takes place in sociocultural contexts, and specifically, authors explore whether the sociocultural context of women's empowerment is important in shaping her behaviour. Using data on 1,594 Nepalese married women from the 1996 Nepal Living Standards Survey (NLSS), the specific issues explored are whether sociocultural context matters for a woman's use of prenatal care and assistance during delivery. To date, no nationally representative study of Nepal had explicitly incorporated district-level contextual data, linked those data with individual-level responses, and then used multivariate hierarchical methods for analysis.

This research is situated within the literature on the contextual effects on health, specifically women's health and reproductive behaviour. While most studies of reproductive behaviour outcomes focus on individual-level data from large-scale surveys, demographers have also been interested in better understanding the degree to which individual behaviour is influenced by attributes of larger sociocultural contexts, from the village-level up to the level of the nation state (Hermalin, 1985; Entwisle, Mason and Hermalin, 1986; Entwisle, Casterline and Hussain, 1989; Smith, 1989; Hirschman and Guest, 1990; Balk, 1994; Pebley, Goldman and Rodriguez, 1996; Sastry, 1996; Degraff, Bilsborrow and Guilkey, 1997; Duncan, Jones and Moon, 1998; Diez-Roux, 1998 and 2001). Similarly, empirical investigations of gender empowerment context and its impact on prenatal care use and reproductive behaviour have been reported for a number of countries, including Bangladesh (Balk, 1994), Nepal (Morgan and Niraula, 1996), India (Chacko, 2001; Stephenson and Tsui, 2002) and Nigeria (Kritz, Makinwa-Adebusoye and Gurak, 2000). Those studies have found that regional differences in aggregate measures of the status of women can produce differences in individual behaviour. While a woman's status is important, those studies indicate that gender context contributes to differences observed in reproductive and maternal health outcomes. Moreover, a sociocultural context may reveal opportunities to explore area-based policy options in conjunction with traditional policy approaches that typically focus on the individual.

In this paper, one specifically focuses on two district-level contextual measures of women’s empowerment: (a) the *gender-related development index (GDI)*, a measure that focuses on the gender disparities in basic human capabilities between men and women, specifically in terms of life expectancy, educational attainment, and income; and, (b) the *gender empowerment measure (GEM)*, a measure of gender deprivation based on participation and empowerment focusing on women’s participation in economic, political, and professional activities (NSAC, 1998). Consider the geographic variation in gender context within Nepal. Figures 1 and 2 reveal variations across the frequently used geographical typologies of Nepal: the three ecological zones (Mountain, Hill and Terai), the five development regions (Far-western, Western, Mid-western, Central, and Eastern), the 14 zones (not shown) and the 75 districts. Such variation in GDI and GEM across districts suggests that research examining women’s status and reproductive behaviour may be enhanced if gender context variables are considered. Authors note that district-level data from the Nepal Human Development Report (NSAC, 1998) and the annual reports from the Ministry of Health-Nepal (1995, 1998 and 2001) similarly reveal considerable inter-district disparities in patterns of fertility, morbidity, mortality as well as measures of health and human development.

Figure 1. Gender development index across districts

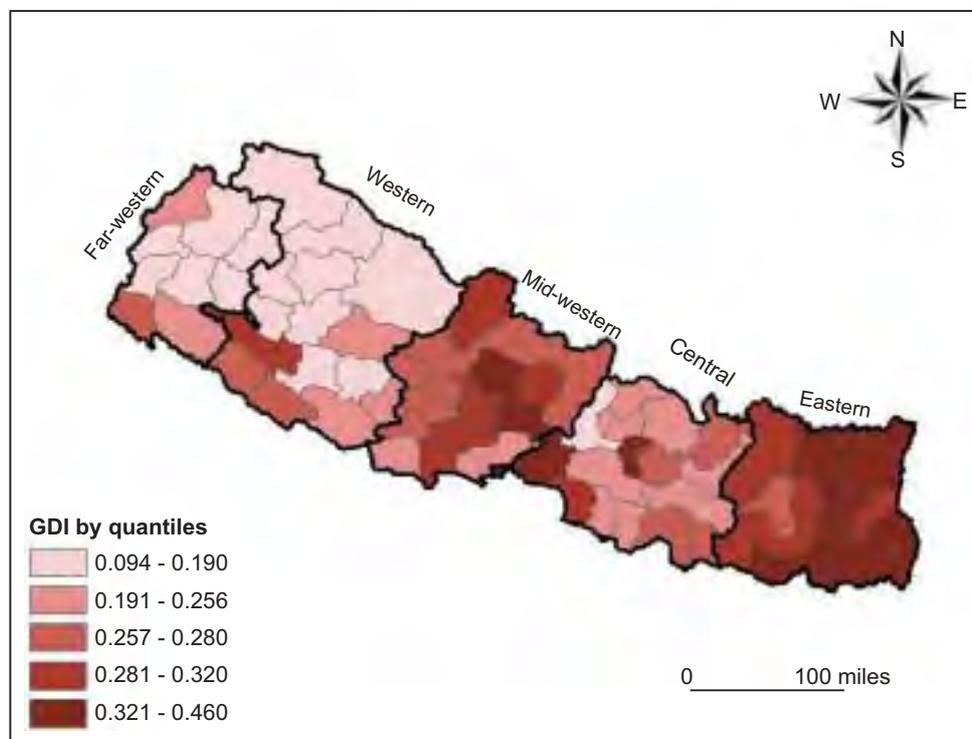
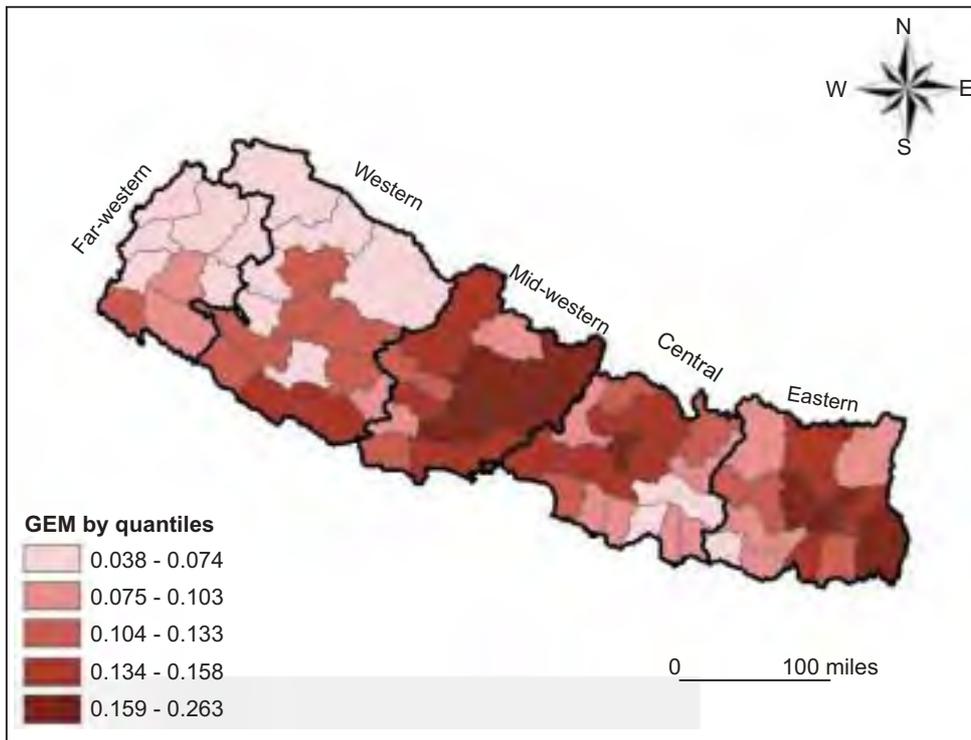


Figure 2. Gender empowerment measure across districts



To date, contextual assessments of reproductive health outcomes in Nepal tend to be fairly descriptive, based on tables that provide demographic and health outcome data broken down geographically by either ecological zone, development region or an urban-rural distinction. That is, broad comparisons of contextual effects between urban-rural residence and between ecological zones are examined. However, as complex geographic variation exists in many demographic, socio-economic and health measures, this might imply that neither a crude urban-rural analysis nor a regional analysis is sufficient for an adequate assessment of context. In the present study, based on data from the NLSS 1996, the choice of geographical units is a pragmatic one. Districts offer a reasonable balance between small communities and large, heterogeneous ecological zones or development regions (see Hirschman and Guest, 1990). An examination of lower-level community characteristics could provide additional information that is relevant to the study of women's reproductive behaviour, but such data are not available; neither collected systematically by the government and non-governmental agencies nor included in the collection of NLSS. Extensive studies of the interplay between macro-micro level effects have been examined in neighbourhoods of one particular district of Chitwan (Shivakoti and others, 1999) but comparable data for other districts in Nepal do not exist.

Theoretical framework

The health behaviour model defines a set of independent variables that influences an individual's health-seeking behaviour (Anderson, 1995). While this model provides a framework for understanding influences at the individual-level, which effects the motivation and need to seek care, it does not take into account influences at the contextual-level (Stephenson and Tsui, 2002). During the last two decades demographic literature, however, has given attention to such contextual effects, particularly with the introduction of multilevel modelling, thus relating health outcomes to community characteristics. This emergent literature supported a macro-micro framework that asserts social changes at the macro-level determine micro-level opportunities and constraints, thereby influencing individual decisions and health outcomes (Axinn and Barber, 2001). Macro-level determinants often provide information not captured by individual-level data. For example, mean income of a community may be an indicator of school quality, road conditions, or environmental conditions of the community that could be related to health that affects everyone in the community regardless of individual-level income (Diez-Roux, 1998).

Several studies on fertility, contraceptive use, and maternal health care focus on the influences of community-level characteristics (Balk, 1994; Pebley, Goldman and Rodriguez, 1996; Degraff, Bilsborrow and Guilkey, 1997; Chacko, 2001; Stephenson and Tsui, 2002, 2003). Stephenson and Tsui (2002) use a multilevel modelling strategy to assess the presence of household- and community-level variation in four types of reproductive health-care services (contraceptive services, antenatal care, delivery in a medical institution, and reproductive tract and sexually transmitted infection services) in Uttar Pradesh, India. Using indices of economic development, health infrastructure, reliance on traditional forms of health care, and population size as their community-level variables, they found that facility and community factors influenced health-service use. The general lack of similar research is attributed to the limited availability of community data that can be linked to household and individual surveys (Fox and others, 2003). Indeed, research using similar methods would be of particular relevance to policy makers as omitted community variables may play a significant role in determining a particular outcome (Sastry, 1996). This is now possible due to the increasing availability of data collected at the community-level, the integration of data across levels using geographic information systems (GIS), and methodological advances in multilevel models.

Women's empowerment and health status

While the current work is situated in the health behaviour and contextual influences on health framework, it is also firmly grounded in the women's health status and more broadly women's empowerment literatures. Empirical studies consistently find that variables relating to women's status are negatively correlated with fertility, maternal health and mortality (Watkins, 1993, Sen, Germain and Chen, 1994, Presser, 1997, Sen and Batliwala, 2000). The women's empowerment literature has also called attention to the interaction between micro-macro processes (Mason, 1987; Sen, Germain and Chen, 1994; Riley, 1997, Kishor, 2000, Presser and Sen, 2000; Dixon-Mueller, 2003). With the shift from the concept of women's status to women's empowerment, the importance of gender context has been emphasized, where empowerment has been defined as "more dynamic and comprehensive than the relatively static concept of 'status of women' and 'female autonomy'" (Dixon-Mueller, 2003, p. 91).

The classification of indicators of empowerment, as defined by Kishor (2000, p. 131), in to those that provide evidence of empowerment, sources of empowerment, or settings for empowerment are all measured at the individual or household-level but they could be extended to higher organizational or sociocultural contexts. Following Sen and Batliwala (2000), we acknowledge the importance of the power relations at different levels within which women's lives are enmeshed: household/family, community/village, the market and the state.

Evidence has been found in the empowerment literature that although an individual woman's ability to gain control over her life is important for demographic change, external forces operating at the macro-level are just as important in creating a context that is conducive (or not) for empowering women, which may then result in improvements (or setbacks) in reproductive health outcomes. Riley (1997) contends that improvements in women's education and employment under a context that is not empowering may not bring about demographic changes. Indeed, the education of women is not always associated with smaller family size in developing countries (King and Hill, 1993). In Pakistan, the effect of education on fertility is only observed in urban areas where opportunities for education to translate into employment and decision-making exist. In South Asia, as a whole, less conclusive evidence is found indicating a relationship between education and family size that is highly context-specific (Jeffery and Basu, 1996). Riley (1997) reported that sometimes women with no formal education had lower fertility and higher contraceptive use simply because they lived in a society where there was an overall high education level. Furthermore,

in contexts of high gender equity even small increments in education reduce fertility, whereas in contexts of low gender equity, relatively high levels of education are needed to bring about changes in women's empowerment (Dixon-Mueller, 2003). Thus, the way that these processes are linked appears to be context-dependent.

Several studies have examined the effects of gender context on reproductive outcomes. For example, differences in gender contexts in the northern and southern regions of India have prompted numerous studies where researchers have repeatedly found differences in fertility and other reproductive outcomes between the two regions (Dyson and Moore, 1983). A portion of the difference has been attributed to levels of development and most notably the differing position of women in the two regions. It has been argued that gender systems of different contexts play an important role in shaping reproductive behaviour. Empirical investigations of the macro-level gender context and its impact on reproductive behaviour have been explored in various contexts in other countries: Bangladesh (Balk, 1994), Nepal (Morgan and Niraula, 1996) and Nigeria (Kritz, Makinwa-Adebusoye and Gurak, 2000). Those studies have noted that while the status of an individual woman is an important factor, the macro-level context of gender equality that surrounds an individual also contributes to differences in reproductive health outcomes.

Data

In the prior literature, few studies have linked individual-level data with contextual level measures, especially on those that have been collected at the macro-level and that explicitly focus on measures of women's empowerment. The main objective of the present study is to explore the impact of gender context on two dichotomous outcome measures: use of prenatal care and assistance during delivery (described below). Our theoretical model, adapted from Hirschman and Guest (1990) is illustrated in figure 3 (see also Kritz, Makinwa-Adebusoye and Gurak, 2000).

The individual-level (level 1) and district-level (level 2) data used in the study are derived from two separate sources. Individual-level characteristics and the reproductive outcomes are drawn from the 1996 Nepal Living Standards Survey (NLSS 1996a, 1996b). District-level measures of gender contexts were obtained from the Nepal Human Development Report (NSAC, 1998).

Figure 3. Model of reproductive behaviour among Nepalese married women

Explanatory variables		Reproductive outcomes
Level 2	Level 1	
District characteristics	Individual, household and community characteristics	
1. Gender Development Index	1. Literacy	1. Use of prenatal care
2. Gender Empowerment Measure	2. Wage employment	2. Assistance during delivery
	3. Economic Status of household	
	– Number of durable goods	
	– Presence of toilet/piped water	
	4. Ethnicity	
	5. Health Service Availability	
	6. Urban/Rural residence	
	7. Development Region	
	8. Age*	
	9. Age at marriage*	
	10. Birth order*	

* = controls

Model presentation adapted from Hirschman and Guest, 1990 and Kritiz, Makinwa-Adebusoye and Gurak, 2000.

All variables listed above are defined in tables 1-3.

Individual-level data

The 1996 Nepal Living Standards Survey (NLSS) is a nationally representative survey that collected information on 3,373 households (18,855 individuals including 9,974 females) in 274 wards in Nepal (see Nepal Living Standards Survey Report: Main Findings Volume 1, 1996). The NLSS was designed as a multi-topic survey including questions on household consumption, income, assets, employment, education, health, fertility and migration. While the topical breadth in the NLSS is a strength, an unfortunate limitation is the depth of coverage on reproductive health. Thus, while we are interested in the use of prenatal care, NLSS did not collect data on, for example, the frequency and timing of prenatal visits¹ and prenatal care questions were asked only to the Nepalese women in the total sample having a child under age three (n = 1,660).

The NLSS sample used in all analyses consists of currently married women aged 15-49 that had given birth in the three years prior to the study. After exclusion of cases with missing values² the working sample consisted of 1,594 married women. This sample was representative of all married women of this age group

in the NLSS, particularly with respect to levels of literacy, wage employment, and distance to health post.³ While the geographical distribution of this sample reflects the original NLSS, the women in this study are less urban than the overall NLSS (13 versus 19 per cent), and less likely to be the head of household (6 per cent versus 14 per cent).

Policy relevance and outcome measures

The Programme of Action of the 1994 International Conference on Population and Development (United Nations, 1995) stressed the need to focus on reproductive health outcomes, which are related to measures of access to reproductive health and family planning as well as measures of overall economic development. In the analysis reported in this paper we focus on two dichotomous outcome measures collected within the NLSS on reproductive health (measures of prenatal care and assistance during delivery, see table 1) as well as the influence of contextual variables based on measures of gender development.

Table 1. Dependent individual-level variables, N = 1,594

1. Prenatal Care	A dichotomous variable indicating whether a woman went for consultation during her pregnancy. If a woman sought consultation, the variable was coded 1, otherwise 0. 1 = 469 (29.4 per cent)
2. Assistance during Delivery	A categorical variable indicating the type of assistance the woman received during her delivery. Since the majority of births (almost 90 per cent) in Nepal occur at home, type of assistance is examined rather than place of delivery. The types of assistance are: family/relative, neighbours, traditional birth attendants (TBA), auxiliary nurse midwife (ANM), maternal and child health (MCH) worker, and other. This variable has been recoded as a dichotomous variable with family/relatives/neighbours coded as 0 and TBA, ANM, MCH worker and other as 1. 1 = 369 (23.1 per cent)

The authors focus on prenatal care and assistance during delivery as reproductive health outcomes because in the context of Nepal, there is much need for improvement in these maternal health-related areas. Early and frequent prenatal care is important in disseminating information about pregnancy complications, monitoring the mother's blood pressure, foetal growth, and administering tetanus toxoid vaccinations to help prevent neonatal tetanus – a leading cause of infant death in Nepal. Before policy makers and health planners can understand issues of timing and frequency of prenatal care use, they need to better understand why

women seek out and/or receive prenatal care in the first instance. During the mid-1990s, the NFHS reported that 56 per cent of women in Nepal did not receive any prenatal care. Among the sample of recent mothers in the NLSS a higher proportion of mothers did not receive prenatal care, 70 per cent.

Nepal has witnessed investments in both medical personnel and infrastructure, but despite these changes some ninety per cent of births occur in the home. As Hotchkiss (2001) observed, the majority of women in Nepal do not have access to professional health facilities and services during pregnancy and childbirth. Attention in the policy arena has tended to focus on the type of assistance during delivery rather than the place of birth because assistance during delivery is identified as potentially more effective in reducing both maternal and child mortality. Annual reports from the Ministry of Health (1995, 1998, and 2001) and both the NFHS (1996) and the Nepal Demographic and Health Survey (NDHS) 2001 report approximately 23-33 per cent of births being attended by trained health personnel (variously defined). In line with those data, among the sample of recent mothers in the NLSS (1996), 23 per cent of women received assistance during delivery from either a traditional birth attendant (TBA) and auxiliary nurse midwife or a maternal and child health worker.

In table 2, the individual-level (level 1) variables are defined and described.

Level 1 independent variables

The present models include what Watkins (1993, p. 553) would regard as the usual suspects of salient individual-level variables that influence reproductive health and fertility-related behaviours.

Table 2. Descriptive summary of level 1 independent variables, N = 1,594

A. Individual characteristics		
1. Literacy	19 per cent	If an NLSS participant reported that she could both read and write, literacy was coded as 1, otherwise 0.
2. Wage employment	23 per cent	Wage employment coded as 1 and not employed and self-employed was coded as 0.
B. Household characteristics		
1. Ethnicity		NLSS includes a classification of ethnicity into 14 ethnic groups plus the category 'other.' For the analysis, any ethnic group that
Brahmin (reference)	16 per cent	
Chettri	19 per cent	

Table 2. (continued)

Magar	6 per cent	comprised less than 5 per cent of the total sample was included in the 'other' category. Brahmin is one of the highest castes in Nepal and was used as the reference category.
Tharu	8 per cent	
Newar	6 per cent	
Muslim	6 per cent	
Other	39 per cent	
2. Socio-economic status		
Durable goods	Mean = 2.97; SD = 1.76;	Scale based on household's possession of 12 durable goods (range 0-12).
Toilet/piped water	25 per cent	Women in households with a toilet and/or piper water was coded 1, otherwise 0.
C. Community characteristics		
1. Distance to health post		
Less than 30 minutes (reference)	47 per cent	A continuous variable indicating the time (in minutes) taken to reach the nearest health post from the household was recoded into three categories.
Up to 1 hour	23 per cent	
Over 1 hour	30 per cent	
2. Urban residence	13 per cent	Urban resident coded 1, otherwise 0.
3. Development region		
Far-western (reference)	15 per cent	Region of residence is a categorical variable of the five development regions of Nepal.
Mid-western	13 per cent	
Western	18 per cent	
Central	36 per cent	
Eastern	19 per cent	
D. Controls		
1. Age at marriage	Mean = 16.82; SD = 3.56	Age at marriage was measured on a continuous scale. Range = 4 through 33
2. Birth order	Mean = 3.29; SD = 1.99	Birth order was measured on a continuous scale. Range = 1 through 12

Two characteristics of the woman that have been widely cited in the women's empowerment literature as proxy indicators of women's status are education and wage employment (Cochrane, 1979; Caldwell, 1982). As levels of *literacy* and education were highly correlated, we focused on literacy as it is one of the pathways through which education influences reproductive behaviour (LeVine and others, 2004).⁴ One expects that married women engaged in *wage employment* are more likely to be reproductive innovators (United Nations, 1985; Kritz, Makinwa-Adebusoye and Gurak, 2000). It is to be noted that the direction of causality is unclear with regard to women's employment and reproductive outcomes. Women's employment may be endogenous if the decision to work or

not is correlated with unobservable factors that affect those outcome variables. Regardless, women's employment is an important control variable to include when assessing reproductive health outcomes.

The models include characteristics of household: ethnicity and measures of socio-economic status. *Ethnicity* in Nepal is a complex factor that incorporates religion, occupation and caste, and can both facilitate or hinder use of reproductive health services and contraceptive use. In terms of rank, Chettris, Brahmins and Newars, classified as the higher castes, are expected to be more likely to use reproductive health services. In addition, there are Muslims in Nepal, albeit a small number of them, who may be less likely to use maternal and family planning services if only a male doctor is available (Navaneetham and Dharmalingam, 2002). Households with higher *socio-economic status* are more aware of existing health resources and have easier access to them. Moreover, higher socio-economic status reflects the ability to pay for the costs associated with using health services (Celik and Hotchkiss, 2000; Pebley, Goldman and Rodriguez, 1996).

The models also include three community variables all measured at the individual-level: measures of access to health facilities, urban residence and region of residence. The *accessibility of health services* is often cited as a critical determinant of health-care choice in the developing world (Timyan and others, 1993), where an increase in distance to the health facility is associated with less use. Pebley, Goldman and Rodriguez, (1996) find that distance to the nearest clinic in Guatemala is significantly and negatively related to both antenatal care and delivery assistance, though in a recent study in Guatemala (Glei, Goldman and Rodriguez, 2003) no measures of access were significantly related to pregnancy care, even when distance to the capital city was. In Nepal, inadequate referral linkages, poor quality care, high out-of-pocket costs for consultations and transportation, high levels of illiteracy, and gender bias are factors that are likely to contribute to poor health-care utilization; and in Nepal, accessibility is complicated further by the rugged terrain (Hotchkiss and others, 1998; Hotchkiss, 2001). Indicative of other measures of accessibility and development, *urban residence* and *development region* were also included in the analysis. The literature finds a consistent relationship between urban residence and higher levels of access to, and use of, maternal and family planning services (Obermeyer and Potter, 1991; Pebley, Goldman and Rodriguez, 1996). Indeed, much research in population health identifies the concentration of health facilities and professional medical personnel in larger urban centres with greater economic resources and public

infrastructure. In Nepal most doctors and hospitals/health facilities are concentrated in the main urban centres and in parts of the Eastern, Central and Western Development Region, particularly in Kathmandu and Pokhara. The urban association with prenatal care rates does not always appear. Hotchkiss (2001) in a study of prenatal care in Nepal found that the urban/rural status variable was not significant after controlling for physical accessibility to health care and other individual, household and community characteristics.

Finally, the models also include control variables: age at marriage and birth order both measured on a continuous scale. Birth order is expected to have a negative influence on prenatal care and assistance during delivery, reflecting experience with pregnancy-related matters where women with high-order births do not seek maternal or prenatal care. The literature suggests that women having their first child are more likely to receive prenatal care (Celik and Hotchkiss, 2000; Stephenson and Tsui, 2002; and, Gleit, Goldman and Rodriguez, 2003).

District-level data

As stated early, authors focused on the gender-related development index (GDI) and the gender empowerment measure (GEM). The GDI is a human development index (HDI) designed and adjusted for gender inequality; that is, GDI focuses on gender disparities comparing the attainments of women in relation to those of men in each district (NSAC, 1998). It is composed of the unweighted average of three indices of gender-equal distributions of life expectancy, educational attainment and income and has a value that ranges from 0 to 1. GDI thus captures an overall measure of women's health (life expectancy) and their socio-economic status (educational attainment and income). The national GDI value increased quite dramatically between 1970 and 1990, from 0.125 to 0.300, implying improvements in the capabilities of women in relation to men during that period, but gender disparity remains high and Nepal's value is less than that of other South Asian countries (e.g., Bangladesh 0.340 and India 0.420) and below the average for least developed countries (0.330) (NSAC, 1998).

GEM is a measure of women's status that looks beyond women's deprivation in health, education, and income and examines participation and empowerment of women in economic, political and professional spheres (NSAC, 1998). It is an index that is composed of the unweighted average of women's share of seats in parliament in 1991, women's share of professional jobs in 1991, and women's share of administrative positions in 1991 and is measured as a value that ranges from 0 to 1.⁵ The Nepal Human Development Report (NSAC, 1998, p. 49)

Table 3. Descriptive summary of level 2 independent variables, N = 72*

Gender-related Development Index	The gender-related development index portrays gender disparities comparing the attainments of women in relation to those of men in each district. It is composed of the unweighted average of three indices of gender-equal distributions of life expectancy, educational attainment and income. Mean = 0.26; SD = 0.07; Range = 0.09 through 0.46
Gender Empowerment Measure	This is a measure of women's status that looks beyond women's deprivation in health, education, and income and examines participation and empowerment of women in economic, political and professional spheres. It is an index that is composed of the following variables: 1) Women's per cent of seats in parliament, 1991; 2) Women's per cent share of professional jobs, 1991; 3) Women's per cent share of administrative positions, 1991; 4) Women's per cent share of income, 1996. Mean = 0.12; SD = 0.05; Range = 0.04 through 0.26

* N = 72 as the NLSS does not include women from three of Nepal's 75 districts.

describes Nepal's GEM value (0.190) as "abysmally low in relation to the achievements at the regional and international level" with women in all South Asian countries (e.g., Bangladesh 0.270 and India 0.230), except Pakistan (0.190), more empowered than women in Nepal. Women in the three districts comprising Kathmandu valley—Kathmandu 0.258, Lalitpur 0.263, and Bhakatpur 0.206—are more empowered than their counterparts elsewhere in the country (e.g., many districts in the Far-west had GEM values of less than 0.100; see also figure 2).

One expects prenatal care and assistance during delivery to be lower among women in those districts where the GDI and GEM scores are low compared with women who live in districts where GDI and GEM scores are high. Moreover, as suggested in the authors' theoretical model one anticipates varying effects of individual-level variables, such as literacy, with district differences in GDI and GEM.

Although other variables could have been included as level 2 variables, only GDI and GEM were included in the analysis due to the high correlation with other measures of district-level development and infrastructure such as infant mortality rates, contraceptive prevalence rates and per capita income. It is possible that other important contextual measures exist that could influence women's development and empowerment not captured by either the GDI or the GEM. Authors considered

other available district-level factors but as GDI and GEM are related to measures of health, education, socio-economic status, income and political status no reliable factor emerged. GDI and GEM are significantly correlated with each other 0.725 (p. 001) but as each measure portrays different aspects of gender inequality, the two were entered in separate models.

Analytical methods

Due to the hierarchical structure of the present data, with women clustered within districts, a multilevel modelling structure was employed. Following Stephenson and Tsui (2002), hierarchical modelling techniques offer a mechanism for measuring the influence of community factors and unobserved community effects on health outcomes while providing a robust method for analysing multilevel data (DiPrete and Forristal, 1994; Goldstein, 1995; Diez-Roux, 1998; Diez-Roux, 2001; Raudenbush and Bryk, 2002). A multilevel modelling strategy accommodates the hierarchical nature of the data and corrects the estimated standard errors to allow for the clustering of observations within units (women within districts). Additionally, the dependent variable of interest is dichotomous; therefore, a generalized hierarchical linear model was used. Binary outcomes violate the assumptions of linearity and normality in which a standard hierarchical linear model would be inappropriate. The combined HLM formula for a two-level logistic regression model with women (level 1) nested within districts (level 2) is:

$$\text{Logit } [p_{ij}] = \beta_0 + \beta_1 x_{ij} + u_j$$

Where p_{ij} is the probability of experiencing the outcome for the i^{th} woman in the j^{th} district, β is the vector of unknown parameters, x_{ij} is the explanatory variable corresponding to the i^{th} woman in the j^{th} district and u_j is the random effect at the district. The intercept for the level 1 and level 2 models are the same as this is a simple additive model of level 2 explanatory variables. The incorporation of district-level errors is what differentiates this model from ordinary logistic models. As with any other logistic regression model, there is no random effect at the individual-level.

Separate models were regressed for each of the reproductive outcomes.⁶ Model 1 included all individual-level variables. The final models (2a and 2b) added the level 2 district characteristics of GDI and GEM, respectively. Controls of age at marriage and birth order were also included in all models. Random coefficients were tested, allowing individual variance to vary across districts, for

each level 1 variable but due to its insignificance a fixed coefficient model was used. All variables were also grand mean centered.⁷ In the HGLM case, variance components of each successive model can be translated into an “R² between” that indicates the per cent between variance that has been explained by the addition of variables in the model, as compared to the null model. The formula used is:

$$R^2 \text{ between} = (\text{variance of null model} - \text{variance of model}) / \text{variance of null model}$$

Results

In this section, results for prenatal care and assistance during delivery (table 4) are discussed. For organizational purposes, the commonalities in the models for both outcomes with regard to individual-level effects and contextual-effects were also discussed. Odds ratios are presented for all models and predicted probabilities for selected models of interest calculated.

Table 4. Hierarchical generalized linear model results for maternal care (Odds ratios), N = 1,594

Variables	Prenatal care			Assistance during delivery		
	1	2a	2b	1	2a	2b
Constant	-1.20 ***	-1.23 ***	-1.21 ***	-1.76 ***	-1.79 ***	-1.76 ***
Level 1						
A. Individual						
1. Literacy	3.16 ***	3.02 ***	3.14 ***	1.64 *	1.61 *	1.65 *
2. Employment	1.20	1.16	1.17	1.22	1.20	1.23
B. Household						
1. Ethnicity						
Brahmin (ref)						
Chhetri	0.87	0.88	0.87	1.36	1.37	1.36
Magar	0.19 ***	0.21 ***	0.20 ***	0.69	0.68	0.69
Tharu	0.44 *	0.39 **	0.43 *	1.85 *	1.73	1.90 *
Newar	0.63	0.60	0.58	1.43	1.42	1.47
Muslim	0.42 *	0.43 *	0.45 *	0.94	0.95	0.92
Other	0.51 **	0.51 **	0.53 **	0.87	0.87	0.86
2. Socio-economic status						
Durable goods	1.15 **	1.14 *	1.16 **	1.22 ***	1.22 ***	1.22 **
Toilet/piped water	1.16	1.11	1.09	1.30	1.27	1.34

Table 4. (continued)

Variables	Prenatal care			Assistance during delivery		
	1	2a	2b	1	2a	2b
C. Community						
1. Distance to health post						
Less than 30 min (ref)						
30-60 min	0.78	0.82	0.81	0.60 *	0.61 *	0.60 **
60+ min	0.47 ***	0.49 **	0.49 **	0.47 **	0.48 **	0.46 **
2. Urban residence	2.15 **	1.88 *	1.92 *	1.47	1.40	1.54
3. Development regions						
Far-western (ref)						
Eastern	2.54 +	0.60	1.48	0.91	0.47	1.18
Central	4.16 **	1.80	2.48 +	3.43 *	2.31	4.43 *
Western	8.47 ***	2.74 *	3.69 *	2.01	1.20	2.97
Mid-western	2.66 +	2.01	1.93	2.87	2.69	3.24 *
Level 2						
1. GDI		1.11 ***			1.03	
2. GEM			1.09 **			0.94
Controls						
1. Birth order	0.89 **	0.89 **	0.89 **	0.97	0.97	0.97
2. Age at marriage	0.99	0.99	0.99	0.98	0.98	0.98
Variance components						
Level 2 variance	0.68 ***	0.47 ***	0.62 ***	1.20 ***	1.21 ***	1.15 ***
Standard deviation	0.83	0.69	0.79	1.09	1.10	1.07
R ² between	0.59	0.72	0.63	0.32	0.32	0.35

+p<.10; *p<0.05; **p<0.01; ***p<0.001, for calculation of R² see text of analytical section

In the individual-level models (Model 1) socio-economic status (SES), measured by the number of durable goods in the household, and the availability of a health post within one hour of walking distance are significant predictors for both outcome variables. Higher socio-economic status of the household positively influences women's use of prenatal care and assistance during delivery, while women who live more than an hour away from a health post as compared with women who live 30 minutes away from a health post have negative probabilities on both outcomes. Women's literacy is a strong predictor of increased use of prenatal care and assistance during delivery. Urban residence is a significant predictor for prenatal care use; women living in an urban area are two times more likely to receive prenatal care compared to women living in rural areas. Similarly, development region is an important predictor for prenatal care use, but this factor

is marginally significant for assistance during delivery. Ethnic differences are more prominent for prenatal care than assistance during delivery, though in the latter case *Tharu* women were more likely to receive assistance.

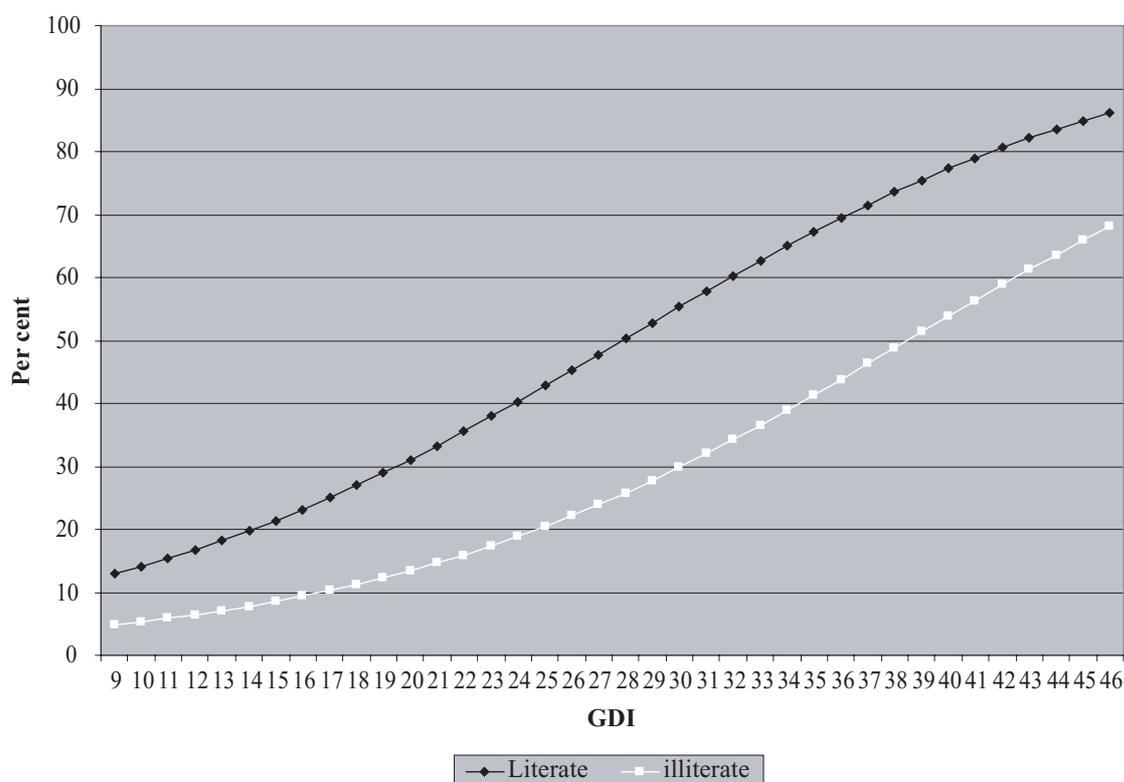
The inclusion of contextual variables in the two-level models (Model 2a for GDI and Model 2b for GEM) typically dampened the effect of the individual-level variables (though this was not true of ethnicity and development region in Model 2b (GEM) predicting assistance during delivery). The variance components are significant in both outcomes measures, suggesting that there is considerable variation between districts. Generally speaking the inclusion of GDI or GEM as a level-2 variable improved the explained variance, thus indicating presence of contextual effects. However, the results varied.

Briefly, for the model of prenatal care use, while much of the between variance is explained by level-1 variables (59 per cent), the inclusion of gender context variables, particularly GDI, improved the explained variance up to 72 per cent. The inclusion of GEM to capture gender context on prenatal care use had a more modest improvement (four per cent increase) in explained variance. In this case, measures of gender development explained more of the variation in prenatal care than did gender empowerment. The GDI and GEM both are significant predictors of prenatal care. For every unit increase in the GDI or GEM the expected odds of women using prenatal care increased by 11 per cent (OR: 1.11; CI: 1.06, 1.16) and 9 per cent (OR: 1.09; CI: 1.03, 1.15), respectively. The inclusion of GDI and GEM as predictors of prenatal care had little effect on the individual and household predictors but a somewhat differential effect on community characteristics. With regard to the latter the influence of distance to health post remains important irrespective of gender context variables though the odds ratios for urban residence and especially the development regions are dampened. Those effects on urban and regional development were not too surprising as gender context is partly associated with indicators of development.

For models of assistance during delivery no evidence was found of a contextual effect in the two-level models, that is, gender context does not seem to matter very much. The effect of both GDI and GEM is not statistically significant. Overall, the models explain between 30-40 per cent of the variance in a women's likelihood of receiving assistance during delivery. Model 2a implies that the inclusion of GDI dampens the regional variation in assistance during delivery contrasting with Model 2b that saw regional variation increase when GEM was included, to the advantage of women residing in the Central region.

One of the benefits of the present modelling approach is that predicted probabilities based on the contextual models could be calculated and graphed. Women’s literacy and GDI were chosen as the individual-level and contextual-level explanatory variables in order to examine the interplay between gender context and individual women’s status vis-à-vis the use of prenatal care. Since the variables were grand mean centred, all other variables are held constant at a mean of 0. In figure 4 a woman’s predicted probability of using prenatal care is shown in relation to the GDI of the district she lives in and her literacy status.

Figure 4. Predicted probabilities for prenatal care by GDI and literacy



The graph shows, as expected, that at low levels of gender development, the probability that a woman who is literate or illiterate using prenatal care is lower than at high levels of gender development. The gap between literate and illiterate women using prenatal care widens as the level of gender development increases indicating that at higher levels of gender development literacy has a greater effect on using prenatal care than at lower levels of gender development. In other words, a woman’s individual literacy makes a larger difference in using prenatal care in districts of higher levels of gender development compared with districts of lower levels of gender development. Districts with low levels of gender development might be constrained on other resources, thus literate and illiterate women have

low use of prenatal care. This is also consistent with the women's empowerment literature that argues that improvements in women's education in a context that is not empowering may not bring necessary demographic changes (Riley, 1997). Conversely, illiterate women living in districts with high gender development are taking advantage of available prenatal care resources and their overall use is higher than literate women in districts with low gender development. Another interesting point to note here is that the gap between literate and illiterate appears to narrow at the highest level of GDI, perhaps indicative of a threshold or saturation level.

Discussion

An attempt has been made in this paper to examine effects of contextual-level district differences in gender development and empowerment on two individual reproductive behaviours: use of prenatal care and assistance during delivery. This study finds that although individual-level differences explain most of the variation between districts, the overall gender context usually increased the variance explained in both outcomes. Both the gender-related development index (GDI) and the gender empowerment measure (GEM) are significant predictors, net of individual-level variables, of use of prenatal care, but not for assistance during delivery.

There are several plausible reasons for this. The correlation between seeking prenatal care and receiving assistance during delivery is high; women who seek prenatal care are more likely to have assistance during delivery as well. Similarly, seeking assistance during delivery may be explained by the need for assistance arising from complications before and during delivery rather than a predetermined choice. In cases requiring assistance during delivery individual proximity to health facilities are a more important factor than the district-level measures of GDI and GEM; neither of which incorporates a direct measure of women's health.

While a woman's literacy is a significant predictor of reproductive behaviour, the present results also show that the effects varied across contexts, thus supporting previous findings that women's status is not a ubiquitous determinant of reproductive behaviour (Balk, 1994; Jejeebhoy, 1995; Riley, 1997). For prenatal care the effect of literacy is greater in contexts of high gender development. Policies may need to be context-specific as well as targeting specific sub-groups of the population. That is, to increase use of prenatal care policies should be directed at both literate and illiterate women in contexts of low gender development, while in contexts of higher gender development the gap in the use of prenatal care is much wider with illiterate women at a relative disadvantage.

This macro-micro level analysis of reproductive health behaviour in Nepal, using the district as context, contributes to the existing literature, and opens up new directions for research on this topic. In particular, consistent with the arguments emerging in the women's empowerment literature, authors argue that paying close attention to processes operating at various geographic scales would help better understand gender differences in reproductive health. Policies and programmes conceived without consideration for local context and place will have limited impact unless they are informed by data that appreciates the vital connection between women's health and women's status across diverse contexts.

This research suggests that studies examining women's empowerment and reproductive behaviour may be enhanced if contextual variables capturing gender development and gender empowerment processes are explicitly included in the models. There are several future challenges and opportunities for researchers in this field associated with theoretical, methodological and data sources. First, we need to better conceptualize and measure the contextual processes or mechanisms that influence reproductive behaviour. Other key questions that need to be addressed are: What other contextual-level variables explain the variation in reproductive health outcomes? At what geographic scales (nested and non-nested) are these variables relevant?

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Endnotes

1. From the NFHS 1996 we know that approximately 40 per cent of Nepalese women that received prenatal care did so during the late stages of pregnancy (third trimester) and that only nine per cent of mothers made the now recommended minimum of four visits during the pregnancy.
2. Missing values were mainly encountered for ethnicity, 55 cases. Cases with missing values also include age at marriage (3), literacy (2), and birth order (9).
3. The authors' sample of 1,594 recent mothers aged 15-49 broadly match the distribution of married women aged 15-49 sampled in the NLSS. The NLSS Main Findings Report reports: (a) literacy rates among women over 15 was 19 per cent overall matching closely the rate with the authors' sub-sample; (b) 22 per cent of women were in non-agricultural waged employment compared with 23 per cent in the sample; (c) 44 per cent of all women are within 30 minutes of a health post vs. 47 for this sample.
4. While literacy *rates* have increased over the past few decades, high rates of female illiteracy persist in Nepal (75 per cent in 1995/96, NSAC, 1998). Almost 80 per cent of women in the NLSS 1996 sample have had no exposure to schooling and very few have had an above primary level education.
5. In the model, GDI and GEM were entered as percentages rather than used a scale of 0 to 1.
6. Authors tested the argument as to whether women's employment is a truly independent predictor by running a separate model (removing women's employment). Results, not shown, do not substantially change the nature of the present findings.
7. Independent variables are centred around a grand mean by subtracting each participants value on the independent variable from the mean of that variable across the mean of all other participants in the study.

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Levels and Trends in Child Malnutrition in Bangladesh

The interventions for improving girls' education should be strengthened since women's education is a powerful weapon to reduce child malnutrition. Better knowledge and skills enable women to improve the way they care for and feed their infants.

by Sumonkanti Das, Md. Zakir Hossain and
Mossamet Kamrun Nesa*

Malnutrition is a persistent problem for both children and mother throughout the world. In developing countries malnutrition is an important root of infant and young child mortality, morbidity and reduced life span. It is considered that if malnutrition cannot be reduced and prevented, it will be impossible to achieve many of the Millennium Development Goals (MDGs) including the goals on extreme poverty and hungry, primary education, child mortality, and incidence of infectious diseases. The World Summit for Children in 1990 recognized malnutrition as a contributing factor in half of all deaths occurring among young children. The nutrition goals for the decade 1990-2000 include reduction of both

* Sumonkanti Das, Lecturer; Md. Zakir Hossain, Professor and Mossamet Kamrun Nesa, Lecturer, all from Department of Statistics, Shahjalal University of Science & Technology, Bangladesh, e-mails: sumon_148@yahoo.com, mzhossain_bds@yahoo.com and nesa1912@yahoo.com.

moderate and severe protein-energy malnutrition among children under five years of age by one half of the 1990 levels (UNICEF, 1990). However, the reduction of child malnutrition by half in a decade was one of the most ambitious goals set by the various summits convened during the 1990s. As a result, all of the nutrition goals were not successfully achieved during the period 1990-2000. As a step towards building a strong foundation for attaining the internally agreed development goals, including the MDGs, a consistent set of intermediate targets and benchmarks during the course of the decade (2000-2010) were set to help the unmet goals (UNICEF, 2003; United Nations, 2001). One of the most important goals regarding nutrition during the period 2000-2010 was the one on reducing child malnutrition among children aged under five by at least one third of the 2000 levels, with special attention paid to children under two years of age—especially reduction of stunted and underweighted children by at least one third during the period 2000-2010 (UNICEF, 2002).

The burden of malnutrition is much higher in South Asia compared to that of Africa and other parts of the world (de Onis, Frongillo and Blossner, 2000; UNICEF, 1998). In South Asia the prevalence of underweight (weight-for-age below -2 SD from the reference median) and stunting (weight-for-age below -2 SD from the reference median) were found to be 46 and 44 per cent, respectively (UNICEF, 2006) which were above the threshold of “very high” prevalence according to the World Health Organization (WHO, 1995). Bangladesh is one of the South Asian countries where over-population, poverty and floods are continual and causing population vulnerability, particularly malnutrition of children and women. Children in Bangladesh suffer from one or more forms of malnutrition—macronutrient malnutrition (such as low birth weight, stunting, underweight) and micronutrient malnutrition (such as iodine, iron, vitamin-A deficiency disorders). Nearly half of the children under five years of age were either underweighted or stunted (UNICEF, 2006). Two thirds of childhood deaths in Bangladesh were attributable to malnutrition (Pelletier and others, 1995). The level of severe stunting as well as severe underweight were found to be at about 28 and 21 per cent, respectively—representing among the highest levels in the world (Mitra and others, 1997).

Regarding reduction of child malnutrition, the country’s goals are the same as the global goals agreed to by the international community Bangladesh (MWCA, 2005). In achieving the goals of the 1990’s World Summit, Bangladesh has made remarkable improvements with regards to child malnutrition. During the period 1990-2000, the prevalence of underweight children fell from 67 per cent to

51 per cent, and stunting came down from 66 per cent to 49 per cent. The coverage of vitamin-A capsule supplementation had increased for children aged 12-59 months from 41 per cent in 1993 to over 90 per cent in 2003 (MWCA, 2005). During that same period, there also have been some important improvements in health care provisions, water supply and sanitation, girls' education, and social and economic opportunities for women (FAO, 1999). However, from the various studies and surveys conducted during the last four decades, it is obvious that the nutrition scenario was not satisfactory in Bangladesh, especially for children and mother (HKI/IPHN, 2006; BBS, 1997; BBS-UNICEF, 2002; NIPORT and others, 2001). Malnutrition affects pregnant women, lactating mothers, and under-five year children and its ill effects spare none.

Considering the extent and magnitude of the issue in Bangladesh, the Government has adopted multifaceted programmes to combat the catastrophic effects of malnutrition. Bangladesh has made significant progress in the area of child survival and development, specifically with regard to child immunization, vitamin-A supplementation and nutrition. UNICEF (2008) reported that Bangladesh is on track to meet the related target under the Millennium Development Goals. However, child malnutrition is still threatening in the country and further improvements are required. In order to achieve the goals and targets set in several programmes and policies, it is necessary to continuously monitor the situation. An evaluation of children's nutritional status is also indispensable to look at the nutrition situation of a community and the effectiveness of nutrition interventions' which will in turn help assess the achievement towards the related Millennium Development Goal. The study attempts to examine the nutritional status of Bangladeshi children in terms of three indicators; stunting, wasting and underweight. The study also investigates trends with regard to each of the above three malnutrition-related conditions.

Data and methodology

The study utilizes the nationwide data of Bangladesh Demographic and Health Survey (BDHS) 2004 to assess children's nutritional status. All the children under five years of age were both weighed and measured by a scale and measuring board, with different methods according to the child's age. For infants and young children aged below 24 months, recumbent length was recorded as opposed to standing heights for children aged 2-5 years. A total of 6,528 children under five years of age were eligible to be weighed and measured. However, the anthropometric data were not available for 6 per cent of the children and deemed

unrealistic for 1.9 per cent children. Finally, completed and plausible anthropometric data were obtained and analysed for 6,005 (weighted) children. It is to be noted that the mother's height and weight were not available for 110 children.

To assess the nutritional status and general health condition of infants, children and adolescents it is necessary to compare anthropometric data with reference growth charts. The World Health Organization (WHO) has recommended the NCHS reference growth data as an international standard for comparing the health and nutritional status of children across all countries throughout the world (Gibson, 1990). However, this presents some limitation in the context of geographic, cultural, socio-economic and genetic factors for infants (Grummer-Strawn, 2002). By contrast, it is evident that the growth in height and weight of well-fed, healthy children, or children experiencing unconstrained growth from different ethnic backgrounds and continents is reasonably similar, at least for 5 years of age (Graitcer and Gentry, 1981; Martorell, 1985). Moreover, according to Stephenson, Latham and Jansen (1983), there is little difference between the growth curves for members of elite groups in less developed countries and those for infants and children of similar age in industrialized nations. In this connection, NCHS reference population is applicable for measuring the nutritional status of children in developing countries like Bangladesh. In most of the previous study regarding Bangladeshi children, NCHS reference population was therefore used for assessing the nutritional status of children under age five. Since the study deals with status and trends in child malnutrition in light of the findings of previous studies, in calculation of anthropometric indices—height-for-age (HAZ), weight-for-height (WHZ) and weight-for-age (WAZ) Z-scores, the study considers the United States of America's NCHS as a reference population. The following formulas were used to calculate the anthropometric indices in terms of Z-scores:

$$\text{HAZ} = \frac{(\text{Child's height-for-age}) - (\text{Median of reference height-for-age})}{\text{Standard deviation (SD) values of reference population}}$$

$$\text{WHZ} = \frac{(\text{Child's weight-for-height}) - (\text{Median of reference weight-for-height})}{\text{SD values of reference population}}$$

$$\text{WAZ} = \frac{(\text{Child's weight-for-age}) - (\text{Median of reference weight-for-age})}{\text{SD values of reference population}}$$

Children are classified as severely and moderately stunted (chronic malnutrition), wasted (acute malnutrition) and underweighted (stunted, wasted, or

both) if HAZ, WHZ and WAZ are respectively below -3.0 and between -3.0 to -2.01 according to WHO (1995).

To study the trends in child malnutrition in Bangladesh during the period 1985-2004, the results of six previous surveys have been utilized (a) Bangladesh Household Expenditure Survey 1985-1986, (b) Bangladesh Household Expenditure Survey 1989-1990, (c) Child Nutrition Survey of Bangladesh 1992, (d) Child Nutrition Survey of Bangladesh 1995-1996, (e) Bangladesh Demographic and Health Survey 1996-1997, and (f) Bangladesh Demographic and Health Survey 1999-2000. The study considers age of child, sex, place of residence, regional settings, and mother's education as background characteristics to study the differences in the rates of decline in child malnutrition.

Status of anthropometric indicators for children under 5 years of age

Among the anthropometric measurements, the study considered height and weight of the children corresponding to their age and sex in order to measure their nutritional status. Appropriate height and weight corresponding to each age by sex represents better nutritional status. To identify the nutritional status, it is required to compare the height and weight with the corresponding height and weight of a reference population of the same age and sex. The anthropometric indicators *viz.*, height-for-age, weight-for-age and weight-for-height can be constructed with the help of the anthropometric measurements.

Descriptive statistics of anthropometric indicators

This section mainly explores the status of anthropometric indicators through descriptive statistics. Table 1 shows the average value of the anthropometric indicators (height, weight, height-for-age (HAZ), weight-for-height (WHZ) and weight-for-age (WAZ)) with standard deviation and skewness for children aged under five years. The estimated mean of height and weight obtained were 81.57 cm (± 12.91 cm) and 10.10 kg (± 2.97 kg), respectively. It is observed that skewness of weight was found to be much closer to zero than that of height. The mean of HAZ and WAZ was found to be above the -2 SD level. The estimated means were found to be consistent with the previous 2005 study, that is -1.7 and -1.8, respectively (HKI/IPHN, 2006). However, the mean of WHZ was observed to be close to the -1 SD level indicating a "serious severity" of malnutrition for children. The mean of HAZ also indicates that they were suffering from "critical" malnutrition. Available literature suggests that HAZ should be symmetric (Gibson,

1990). The sample of the study also shows similar results. The estimated results of anthropometric indicators for boys and girls were found analogous to results obtained for both sexes. However, significant differences were observed between boys and girls mean height, weight and WAZ.

Table 1. Descriptive statistics of anthropometric indicators for children under five years of age, Bangladesh 2004

Indicators	Both			Boys			Girls		
	Mean	SD	Skewness	Mean	SD	Skewness	Mean	SD	Skewness
Height (cm)	81.57	12.91	-0.29	82.49*	12.78	-0.34	80.64	12.97	-0.25
Weight (kg)	10.10	2.97	-0.05	10.43*	2.95	-0.10	9.76	2.94	-0.00
Height-for-age Z-score	-1.77	1.31	0.06	-1.75	1.30	0.09	-1.79	1.32	0.03
Weight-for-height Z-score	-0.99	0.96	0.64	-1.00	0.96	1.33	-.99	0.97	1.37
Weight-for-age Z-score	-1.86	1.08	0.58	-1.82*	1.07	0.58	-1.89	1.09	0.60

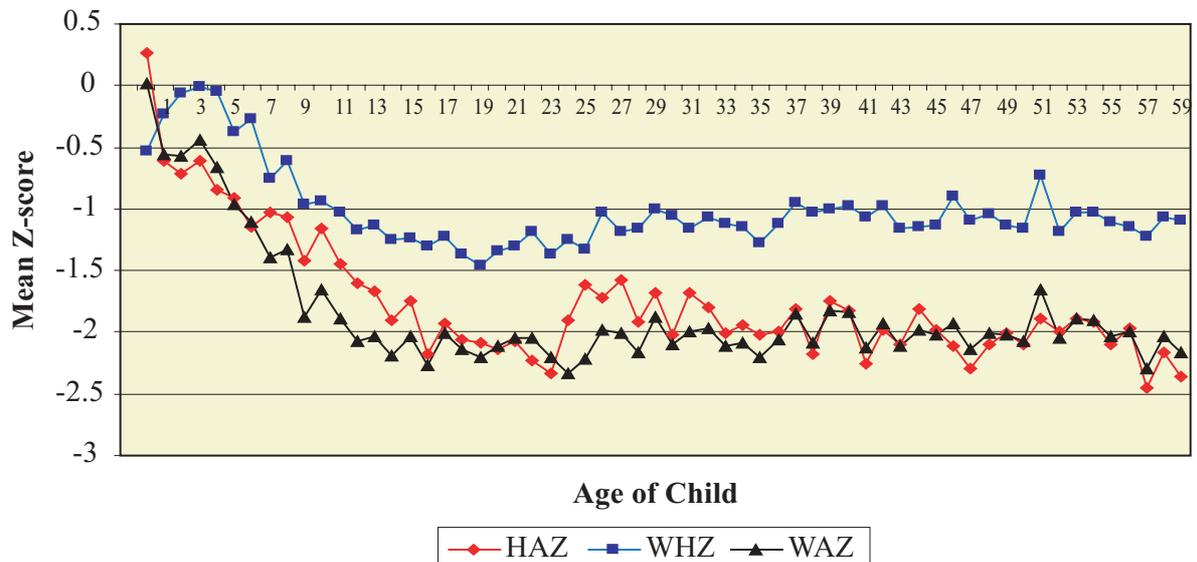
* Indicates significant difference between boys and girls (p<0.01).

Figure 1 illustrates the mean of the three indices (HAZ, WHZ and WAZ) according to the age of children. The figure shows that the mean of HAZ and WAZ decreased sharply up to 15 months of life. However, for children aged 15-59 months, the mean of HAZ fluctuated significantly within -1.5 and -2.5 SD levels. For children older than 2 years of age the mean of WAZ fluctuated slightly along the path of -2 SD level. By contrast, the mean of WHZ increased up to the first 3 months of life and declined gradually before reaching the first year of life and then remaining stable within the range -1.0 to -1.5 throughout the whole period. The worst condition was found to be for children aged 12-23 months as their mean WHZ remained mostly far from -1.00 SD level, indicating a “critical severity” of malnutrition.

Comparison of child anthropometric data with NCHS reference data

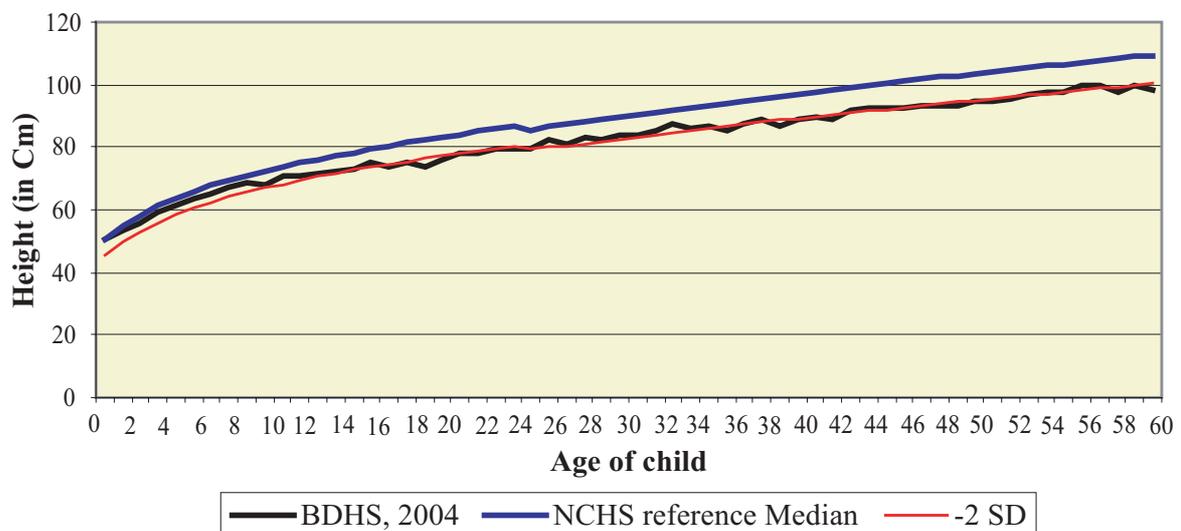
To compare the growth structure of the Bangladeshi children by sex and age, the study utilizes the median height and weight of NCHS reference population. The study uses the reference growth chart of 1978 CDC/WHO, which was published by WHO after a slight revision in 1983 (WHO, 1983). The comparison of median height (in cm) of the children in Bangladesh (BDHS 2004) with that of NCHS reference according to the age is shown in figures 2 and 3 for boys and

Figure 1. Mean Z-score of anthropometric indices by age of child, Bangladesh 2004



girls, respectively. The same comparison of weight (in kg) of children is shown in figures 4 and 5. All the figures depict that during the early months of life, height and weight of Bangladeshi children were below the NCHS reference median and the distance between the line of NCHS reference median and that of Bangladeshi children increased significantly along with age. The distance between the two lines was observed to be higher in case of weight than that of height for both boys and girls. Figures 2 and 3 also show that for both boys and girls the median height was consistent with the line of -2 SD level of NCHS reference after the first year

Figure 2. Comparison of median height-for-age with NCHS median and -2 SD level for boys, Bangladesh 2004



of life. A comparable situation was observed with regard to median weight for Bangladeshi boys and girls, although with a greater variation from the -2 SD level of NCHS reference (figures 4 and 5).

Figure 3. Comparison of median height-for-age with NCHS median and -2 SD level for girls, Bangladesh 2004

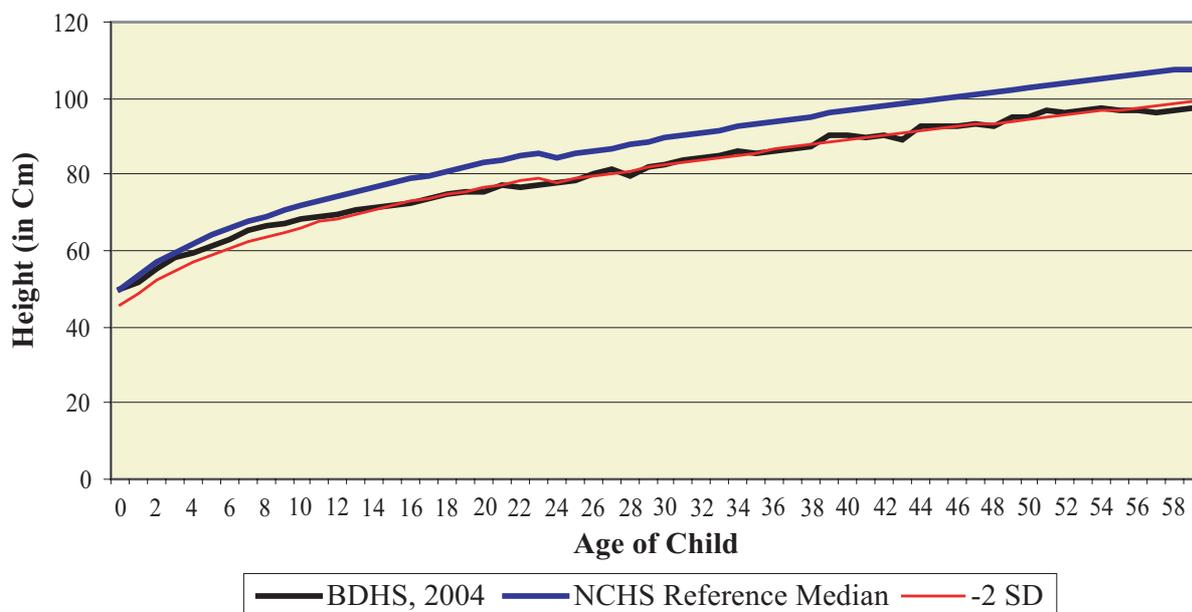


Figure 4. Comparison of median weight-for-age with NCHS median and -2 SD level for boys, Bangladesh 2004

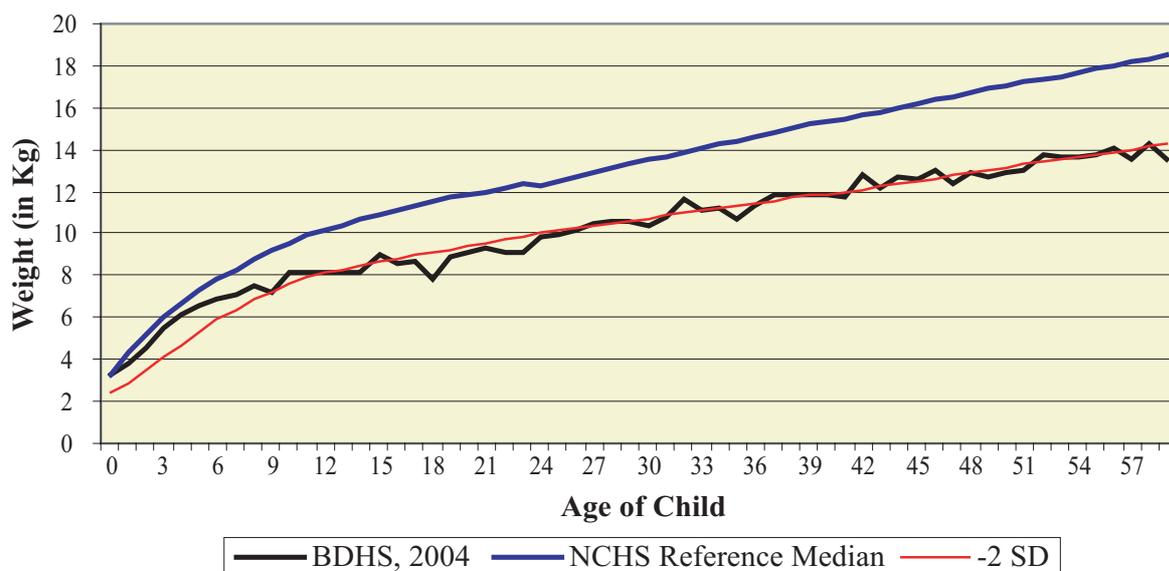
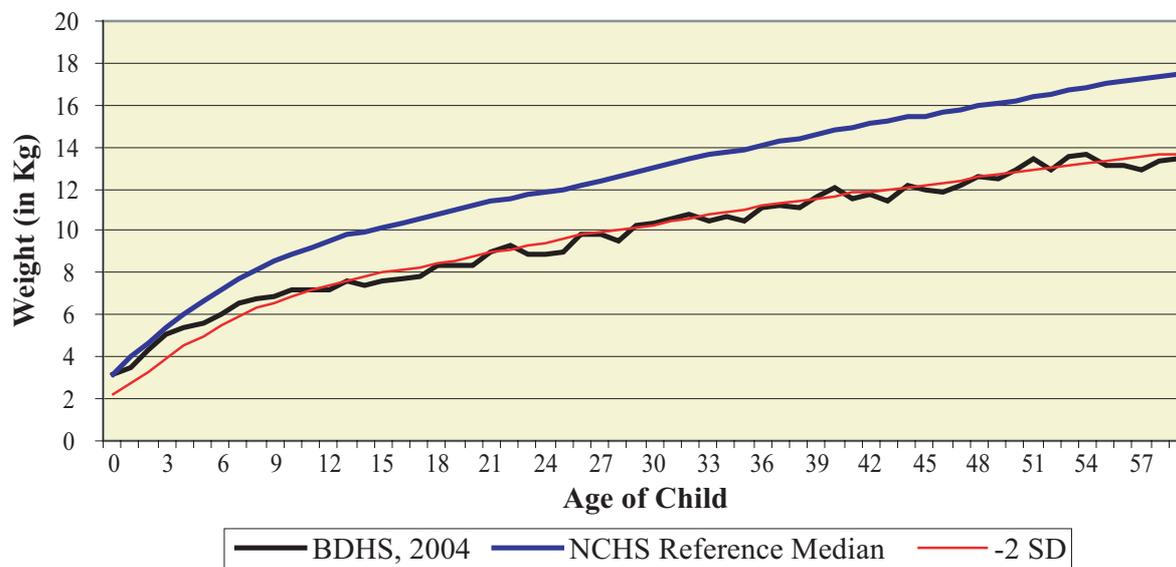


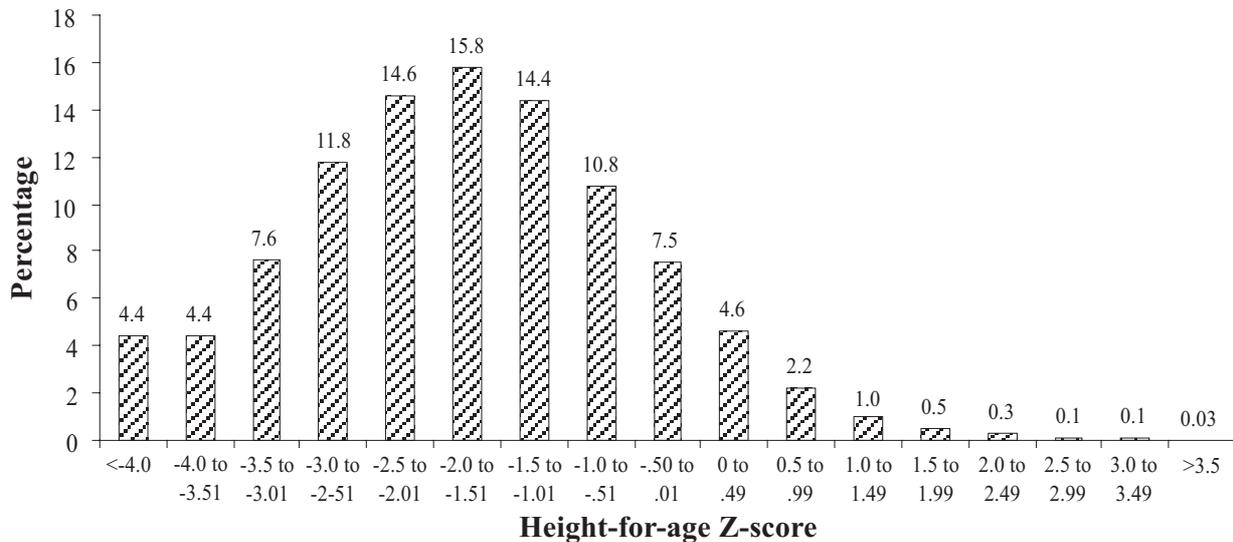
Figure 5. Comparison of median weight-for-age with NCHS median and -2 SD level for girls, Bangladesh 2004



Frequency distribution of anthropometric indices

The distribution of HAZ, WHZ and WAZ of a reference population are very close to standardized Gaussian (Normal) distribution (WHO, 1995). It is recognized that in a well-nourished society (here the United States NCHS is the reference population), the proportion of children below -2 Z-scores is expected to be 2.5 per cent and that below -3 Z-scores is expected to be about 0.1 per cent. Therefore, the proportion of children below a cut-off point (-2.0 or -3.0 Z-score) in a population can be compared with the proportion of the NCHS reference population. The study attempts to explore how the distributions of HAZ, WHZ and WAZ for the Bangladeshi children were far from a normal distribution on the basis of area property. Figure 6 shows that the proportion of children between the range ± 1.0 of HAZ was found to be only about 25 per cent while in normal distribution this proportion should be 68.3 per cent. About 95 per cent of children should lie within the range ± 2.0 Z-score but in case of HAZ for the Bangladeshi children the proportion was found to be only 72 per cent. These findings indicate that the distribution of HAZ for Bangladeshi children was far from the normal distribution.

Figure 6. Frequency distribution of height-for-age Z-score, Bangladesh 2004



A clearer picture of Bangladeshi children's nutritional status was found from the distribution of WHZ (figure 7). The proportion of children having WHZ within ± 2.0 was found to be about 87 per cent, which is closer to 95 per cent. However about 45 per cent of children had WHZ within the range ± 1.0 that was much lower than the expected 68.3 per cent. From figure 7 it is also observed that less than 1 per cent of children were overweight and obese (WHZ ≥ 2.0). Figure 8 shows that only half of children had WAZ within the range ± 2.0 and about 13 per cent children had WAZ below -3.0 which indicate that the distribution of WAZ failed to satisfy the area property of normal distribution.

Figure 7. Frequency distribution of weight-for-height Z-score, Bangladesh 2004

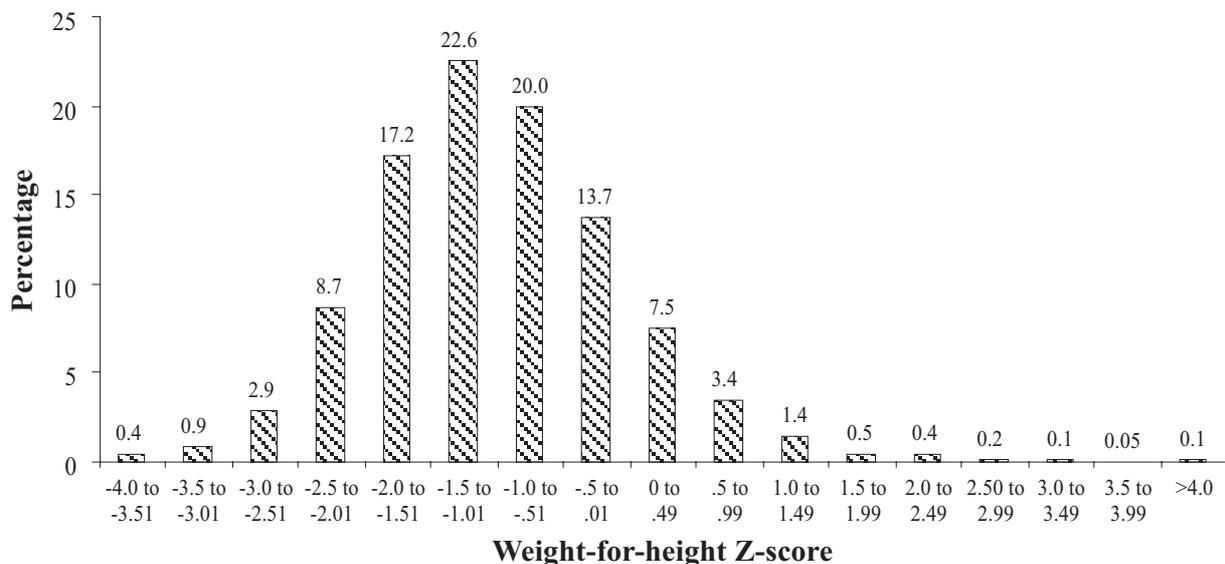
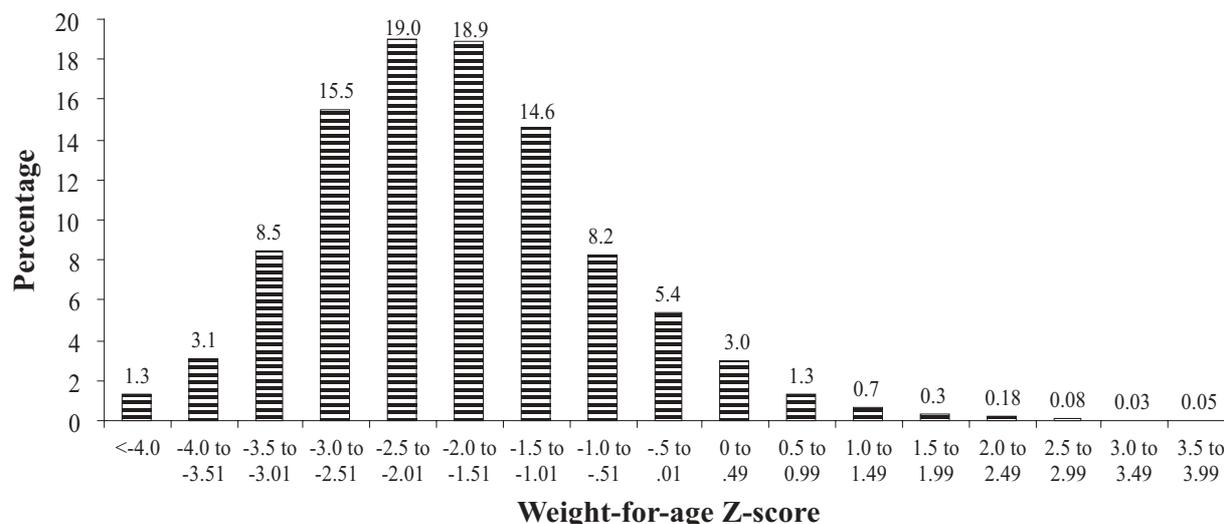


Figure 8. Frequency distribution of weight-for-age Z-score, Bangladesh 2004



Status of child malnutrition

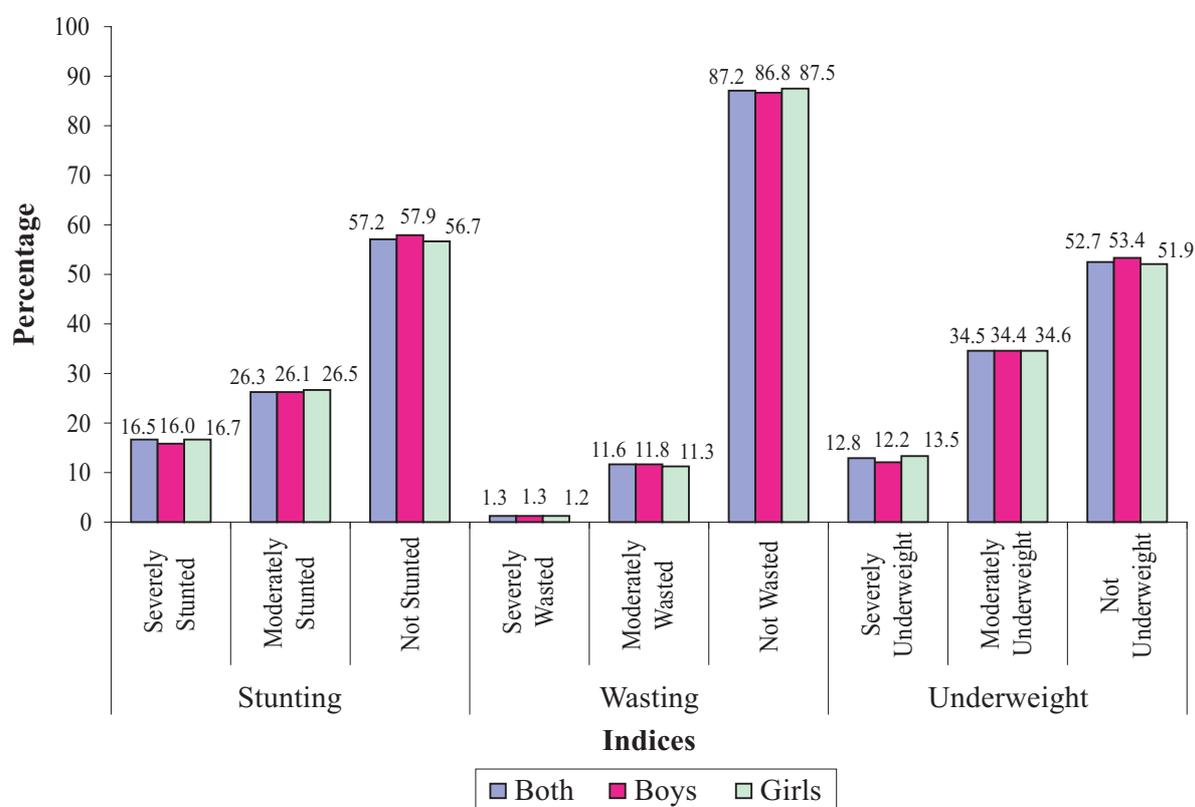
To assess the nutritional status of a population, three anthropometric indices—HAZ, WHZ and WAZ are recommended by WHO (1983). Table 2 shows that about 17 per cent and over one quarter of children were suffering from severe and moderate chronic malnutrition, respectively. The prevalence of stunting (42.8 per cent) creates a threat to Bangladesh for the achievement of the World Summit for Children’s goal of reducing stunting by a third by 2010 as compared with the 2000 levels (UNICEF, 2002). The prevalence of stunting was found to be more or less identical for boys and girls (figure 9). The prevalence of acute malnutrition, presented by lower WHZ, was found to be about 13 per cent with 1.3 per cent severe acute malnutrition. According to WHO (1992), this condition is considered as “serious severity” (10 to 14 per cent prevalence) for children.

Weight-for-age is influenced by both height-for-age and weight-for-height and therefore, this index represents chronic and acute or both forms of child malnutrition. Using WAZ, the national prevalence of child malnutrition is generally measured and compared (UNICEF, 2002). The study categorized a child as undernourished with WAZ below “-2 SD” level and found that about 48 per cent of children fall into the under-nutrition category. This prevalence of under-nutrition is the highest in the world (UNICEF, 2006), similar to the situation in Nepal.

Table 2. Malnutrition status for children under five years of age, Bangladesh 2004

Types of malnutrition	Number	Per cent
Child chronic malnutrition (according to height-for-age)		
Severely stunted	983	16.5
Moderately stunted	1 581	26.3
Nourish (not stunted)	3 441	57.2
Child acute malnutrition (according to weight-for-height)		
Severely wasted	76	1.3
Moderately wasted	6 95	11.6
Nourish (not wasted)	5 235	87.2
Child under-nutrition (according to weight-for-age)		
Severely underweight	771	12.8
Moderately underweight	2 072	34.5
Nourish (not underweight)	3 163	52.7
<i>Total</i>	<i>6 005</i>	<i>100.0</i>

Figure 9. Nutrition status of children by sex, Bangladesh 2004



Two-way classification of HAZ and WHZ indicates that half of the children under five years of age were free from chronic and acute malnutrition (figure 10 and table 3). The cross-classification of HAZ and WHZ indicates a slight improvement of the nutritional status in comparison to the Child Nutrition Survey of Bangladesh (CNSB) 1995-1996 (40.3 per cent) and CNSB-2000 (45.4 per cent) (BBS, 1997; BBS-UNICEF, 2002). The cross-classification depicts that only 14.0 and 22.3 per cent of children were severely and moderately stunted (table 3). The proportion of children who were only stunted (36.3 per cent) was found to be lower than that of 1995-1996 (43.1 per cent) and that of 2000 (43.0 per cent).

Figure 10. Nutritional status of children by HAZ and WHZ, Bangladesh 2004

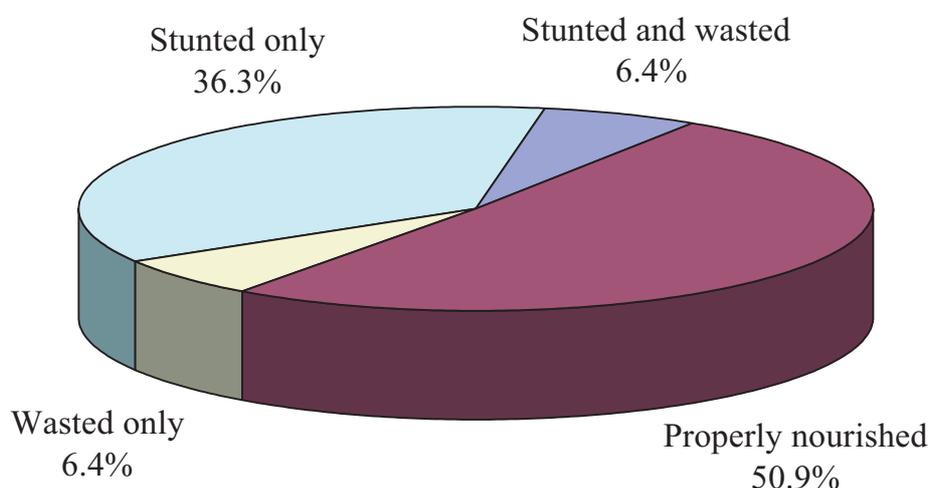


Table 3. Cross-classification of child malnutrition according to height-for-age (stunting) and weight-for-height (wasting) indices, Bangladesh 2004

Weight-for-height	Height-for-age			Total
	Severely stunted	Moderately stunted	Not stunted	
Severely wasted	10 (0.2)	18 (0.3)	48 (0.8)	76 (1.3)
Moderately wasted	136 (2.3)	223 (3.7)	336 (5.6)	695 (11.6)
Not wasted	838 (14.0)	1 339 (22.3)	3 057 (50.9)	5 234 (87.2)
Total	984 (16.4)	1 580 (26.3)	3 441 (57.3)	6 005

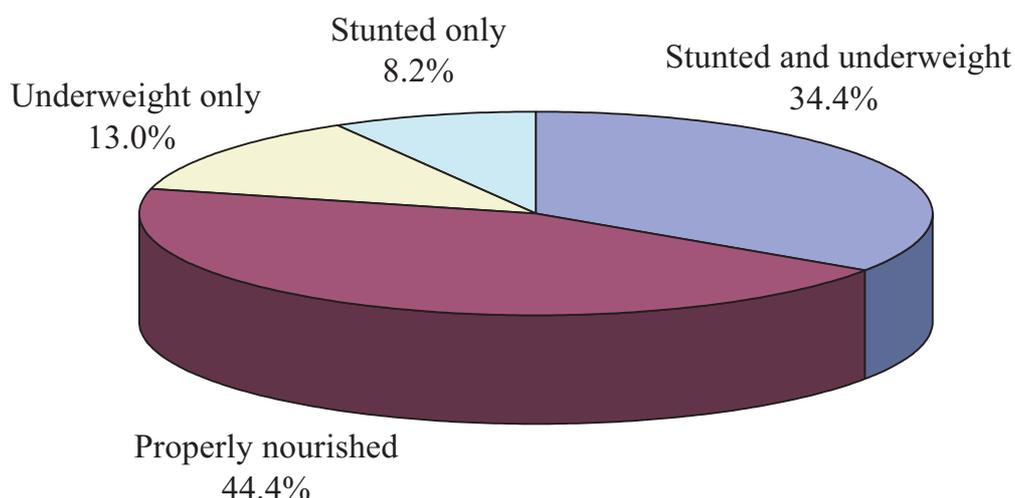
The numbers in parentheses are percentages given on the basis of a total of 6,005 children.

Table 4 shows that about 55 per cent children were found to be chronically malnourished or, undernourished, or both in terms of stunting and underweight. This prevalence was observed among 66 per cent of children in 1995-1996 (BBS, 1997). The proportion of children who were both moderately stunted and moderately underweighted was found to be about 15 per cent. Figure 11 shows that over one third of children were both stunted and underweighted, while 13.0 and 8.2 per cent of children were only stunted and only underweight, respectively.

Table 4. Cross-classification of child malnutrition according to height-for-age (stunting) and weight-for-age (underweight) indices, Bangladesh 2004

Weight-for-age	Height-for-age			Total
	Severely stunted	Moderately stunted	Not stunted	
Severely underweight	474 (7.9)	233 (3.9)	64 (1.1)	771 (12.8)
Moderately underweight	464 (7.7)	895 (14.9)	713 (11.9)	2 072 (34.5)
Not underweight	45 (0.7)	453 (7.5)	2 664 (44.4)	3 162 (52.7)
Total	983 (16.4)	1 581 (26.3)	3 441 (57.3)	6 005

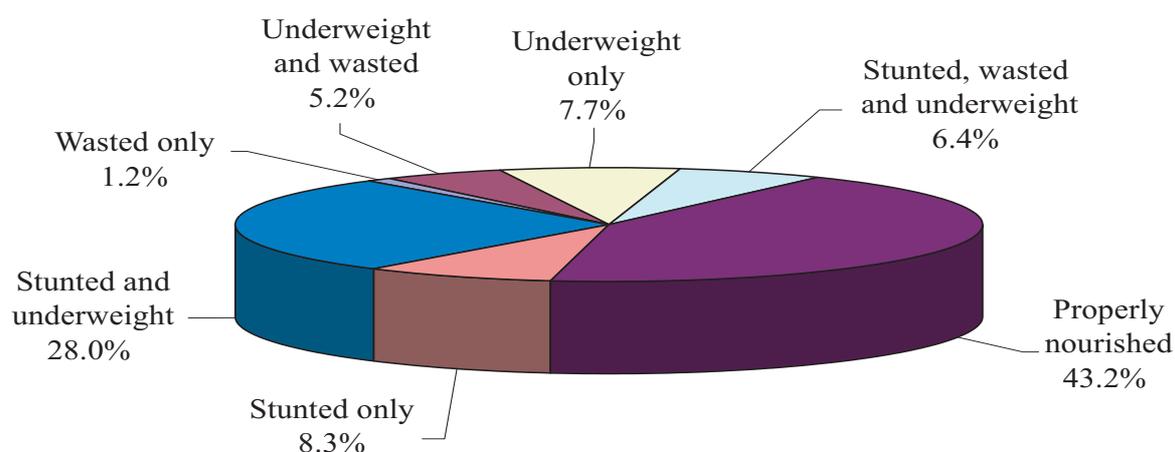
Figure 11. Nutritional status of children by HAZ and WAZ, Bangladesh 2004



To assess the overall malnutrition condition, the study attempts to use the three indices simultaneously. The three-way classification of three indices shows that 43.2 per cent of them were actually nourished (figure 12), which indicates that about 57 per cent of children under 5 years of age in Bangladesh were

suffering from any of the three forms of malnutrition. The proportions of only stunted, only wasted and only underweighted children were found to be 8.3 per cent, 1.2 per cent and 7.7 per cent, respectively. Figure 12 also indicates that 28 per cent of children were both stunted and underweighted, 5.2 per cent were both underweighted and wasted, and only 6.4 per cent suffered from all the three forms of malnutrition.

Figure 12. Overall nutritional status of children by HAZ, WHZ and WAZ, Bangladesh 2004



Trends in child malnutrition in Bangladesh

In this section, the study investigates the trends in child malnutrition through stunting, wasting and underweight for the period 1985-2004. The study also attempts to observe those trends in the light of several background characteristics of children for each of the indicators.

Trends in stunting, wasting and underweight

Figure 13 shows the level of stunting, underweight and wasting for children in Bangladesh during the period 1985-2004. A steady decline was observed during the period 1985-2004 in all the indicators of child malnutrition with the exception of wasting. The prevalence of stunting decreased gradually up to 1992 and then rapidly through the next period, with fluctuation. However, the reduced prevalence of stunting (43 per cent) in 2004 was found to be although above the threshold of “very high” prevalence level. Table 5 shows that the prevalence of stunting decreased by 32 per cent during the period 1990-2000. However, the level of stunting declined by about 5 per cent during the period 2000-2004.

Figure 13. Trends in stunting, wasting and underweight, Bangladesh 1985-2004

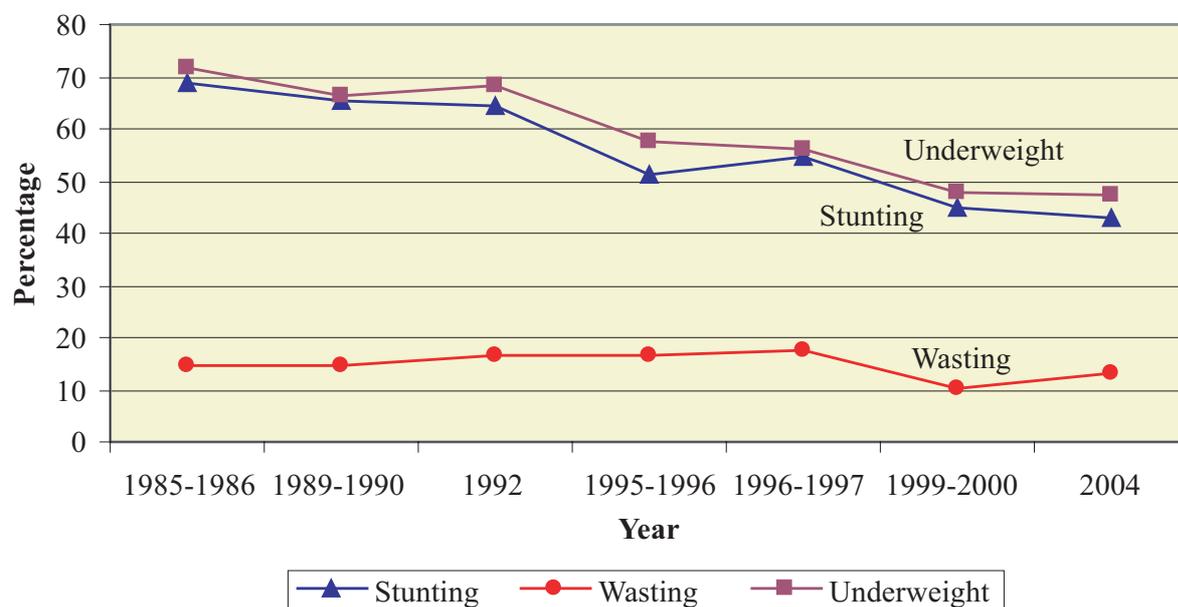


Table 5. Trends in child malnutrition by anthropometric indicators and residence, Bangladesh 1985-2004

Indicators	Area	BBS Child Nutrition Surveys (6-71 months)			BDHS (0-59 months)			Percentage change during			
		1985-1986	1989-1990	1992	1995-1996	1996-1997	1999-2000	1990-2000	1990-2004	2000-2004	
Stunting (HAZ score <-2 SD of NCHS reference)	Urban	58.2	58.3	52.8	42.9	39.4	35.0	37.4	-40.0	-35.8	6.9
	Rural	70.0	66.7	65.8	52.8	56.2	46.6	44.0	-30.1	-34.0	-5.6
	All	68.7	65.5	64.2	51.4	54.6	44.7	42.7	-31.8	-35.0	-4.5
Wasting (WHZ score <-2 SD of NCHS reference)	Urban	13.7	14.0	15.1	13.3	12.8	9.3	11.5	-33.6	-17.9	23.7
	Rural	14.9	14.7	16.9	17.2	18.2	10.6	13.2	-27.9	-10.2	24.5
	All	14.8	14.7	16.7	16.6	17.7	10.3	13.0	-29.9	-11.6	26.2
Underweight (WAZ score <-2 SD of NCHS reference)	Urban	63.8	62.7	57.2	46.3	41.9	39.8	42.4	-36.5	-32.4	6.5
	Rural	72.4	66.7	69.8	59.3	57.8	49.2	48.5	-26.2	-27.3	-1.4
	All	71.5	66.5	68.3	57.4	56.3	47.7	47.5	-28.3	-28.6	-1.0
Sample size	Urban	1 411	843	785	814	448	894	1 174			
	Rural	1 872	1 513	1 325	1 800	4 339	4 527	4 831			
	All	3 283	2 356	2 110	2 614	4 787	5 421	6 005			

Sources: BBS, 1987; BBS, 1991; BBS, 1994; BBS, 1997; Mitra and others., 1997; NIPORT and others, 2001.

* Calculated by authors.

The prevalence of child underweight decreased from 66.5 per cent in 1989-1990 (the base year for the MDGs) to 47.5 per cent in 2004, representing a 29 per cent change during the period. These results suggest that current interventions should be pursued if the MDG target of a 50 per cent decline in child underweight are to be achieved by the year 2015. In comparison to 2000, the level of underweight was found to be stable during the period 2000-2004. Although Bangladesh has shown a significant reduction in malnutrition over the past 15 years (1990-2004), the magnitude of the problem is still a great concern for the country since the prevalence of underweight and stunting were found above the threshold of “very high” prevalence as indicated by WHO.

A dissimilar pattern of trend in the prevalence of wasting was found from 1985-1986 (14.8 per cent) to 1996-1997 (17.7 per cent). According to WHO, this prevalence of wasting indicates “critical severity” of malnutrition (WHO, 1992). After a huge decline in the prevalence of wasting (about 8 per cent) during 1996-2000, it increased up to 13.2 per cent in 2004, which indicates that the children were in “serious severity”. Over the last two decades, the prevalence of wasting in Bangladesh has never fallen below 10 per cent.

Trends in child malnutrition by background characteristics

Although the level of child malnutrition decreased, the trends of decline should be observed according to several background characteristics. The national declining trends of child malnutrition mask both interregional differences and differences in socio-economic status (HKI/IPHN, 2006). The study considers several important variables *viz.*, place of residence, regional settings (division), sex and age of child, and mother’s education status as background characteristics in order to investigate the differences in trends and better identify the vulnerable group.

Residence

Over the whole period 1985-2004, the prevalence of chronic malnutrition was found to be higher among rural children compared with their urban counterparts. Over two thirds of rural children were found to suffer from chronic malnutrition during the period 1985-1992. The proportion then started to decline rapidly, though it remained over the threshold of “very high” prevalence until 2004 (table 5). By contrast, in urban area the level of stunting dropped to the stage of “high” prevalence after 1995-1996 (varying from 35 per cent to 39 per cent) from the stage of “very high” prevalence (more than 42 per cent) during the period

1985-1995. In urban areas, highest percentage of decline (40 per cent) was recorded during the period 1990-2000. Surprisingly, the prevalence of stunting was found to increase (7 per cent) for children living in urban areas during 2000-2004.

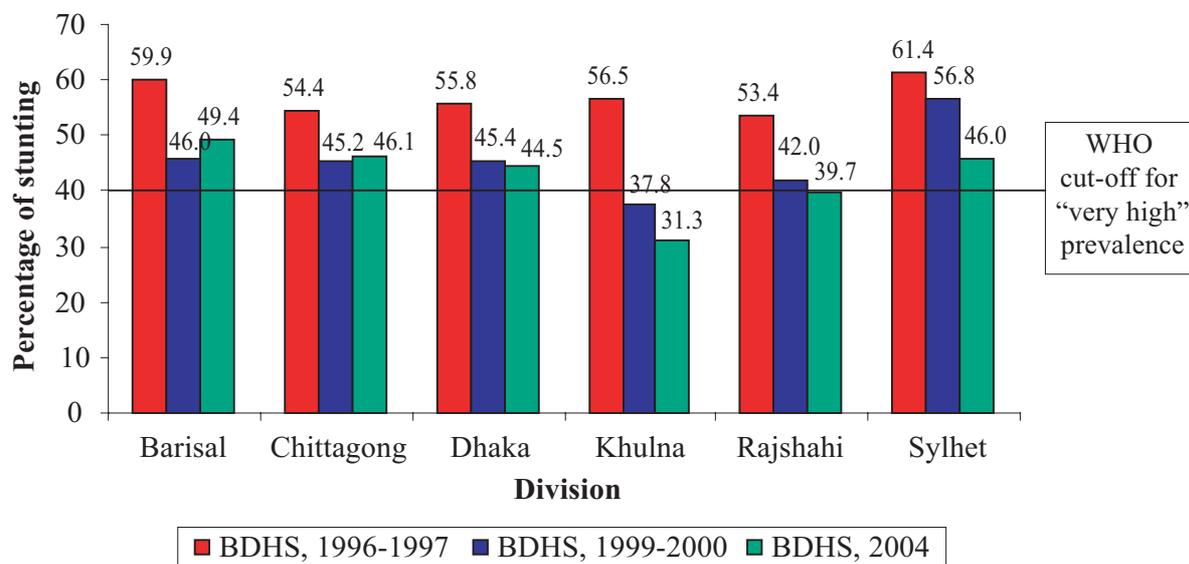
In case of acute malnutrition, the prevalence rate fluctuated over the whole period 1985-2004 both in rural and urban areas. In rural areas, the trend in acute malnutrition was found to be identical to that prevailing at the national level. Over the whole period 1985-2004, the prevalence of child underweight was found to be higher in rural than in urban areas. Over three fifths of rural children were found to be underweight during the period 1985-1996. Like stunting, the decline in under-nutrition was found to be higher in urban areas in both the period 1990-2000 (36.5 per cent) and 1990-2004 (32.4 per cent); however, it increased by 6.5 per cent during 2000-2004. By contrast, though the prevalence of underweight in rural areas declined steadily over the whole period, nearly half the children were still found to be undernourished. These findings indicate the necessity to undertake proper food and nutrition interventions for children in rural areas to overcome the situation.

Regional settings

The study considers six divisions to examine the trends and differences in child malnutrition across some of the country's regions during the period 1996-2004. Significant differences were found in the malnutrition status by division. Figure 14 shows that the greatest improvement in reducing stunting was found in *Khulna* division, where the level of stunting declined to 31.3 per cent in 2004 from 56.5 per cent in 1996-1997, the current prevalence being below the cut-off point of "very high" prevalence recommended by WHO. In *Rajshahi* division, the prevalence of stunting was found to be just below the threshold point in 2004. Though *Dhaka* and *Chittagong* division have improved communication and infrastructure, chronic malnutrition was found to be over the threshold level. The reason may be the high urbanization rate in the two industrialized divisions, which relegate most of the children to unhealthy settings such as slums. In *Sylhet* division, a rapid and steady decline was observed in the prevalence of stunting between the periods 1996-1997 (61.4 per cent) and 2004 (46 per cent), although the prevalence remained above the threshold.

In all the divisions, the prevalence of acute malnutrition decreased tremendously in 1999-2000 (ranges from 9.3 per cent to 13.0 per cent) from 1996-1997 (ranges from 13.5 per cent to 21.3 per cent) but increased slightly in 2004

Figure 14. Trends in stunting by division, Bangladesh 1996-2004



except in *Barisal* (figure 15). The level of acute malnutrition was found to be higher among children of *Khulna* and *Rajshahi* over the whole period; however, a steady decrease could be observed in *Barisal* division. In 2004, the level of wasting in all the divisions was found to be under the threshold of “critical severity” yet slightly above the cut-off point of “serious severity” (within the range of 12-14 per cent).

Figure 15. Trends in wasting by division, Bangladesh 1996-2004

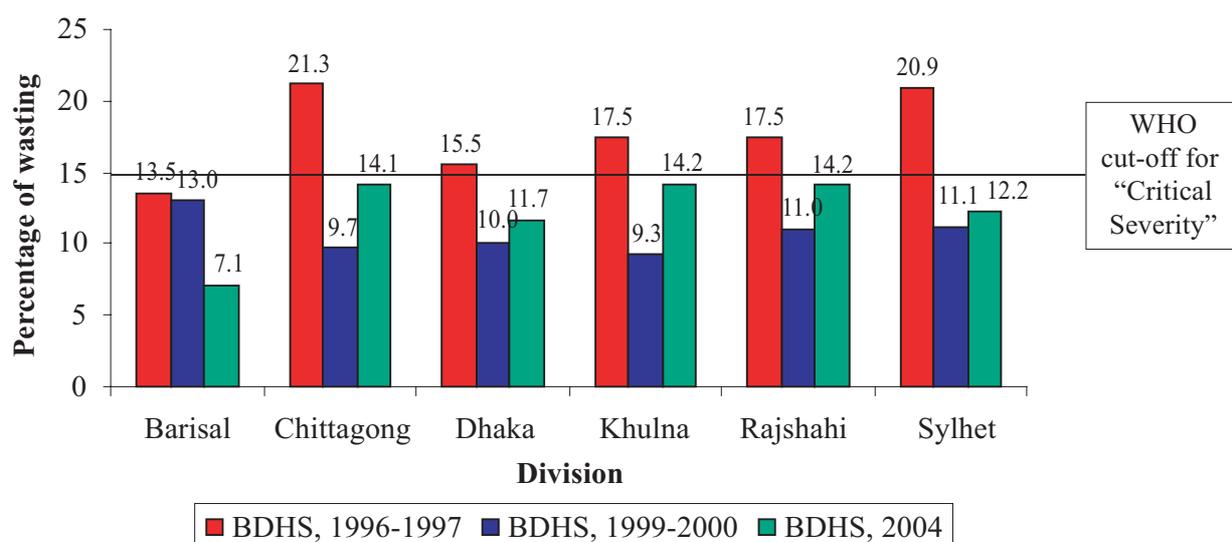
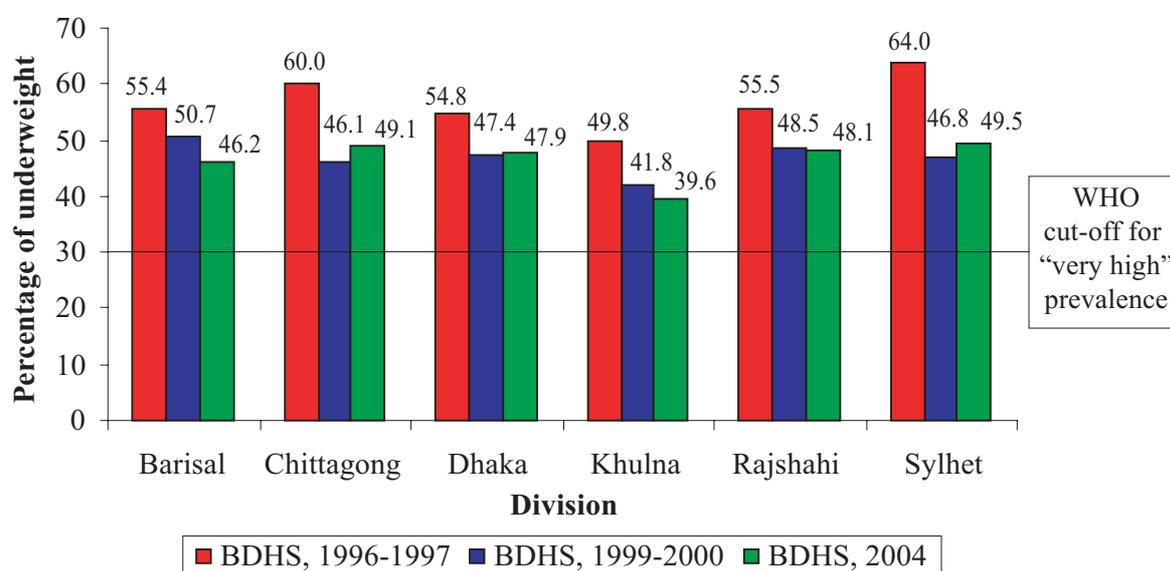


Figure 16 shows that the prevalence of underweight was found to be lowest in *Khulna* over the whole period 1996-2004. The level of underweight declined to 39.6 per cent in 2004 from 49.8 per cent in 1996-1997. This result is consistent with the Nutrition Surveillance Survey 2005 where the prevalence of underweight was found to be 38.9 per cent (HKI/IPHN, 2006). In other divisions, the prevalence of under-nutrition decreased during 1996-2000; yet, the level slightly increased in 2004 for *Dhaka*, *Chittagong* and *Sylhet* divisions. The most worrying matter is that the prevalence of underweight was found to be over the threshold of “very high” prevalence in all the divisions.

Figure 16. Trends in underweight by division, Bangladesh 1996-2004



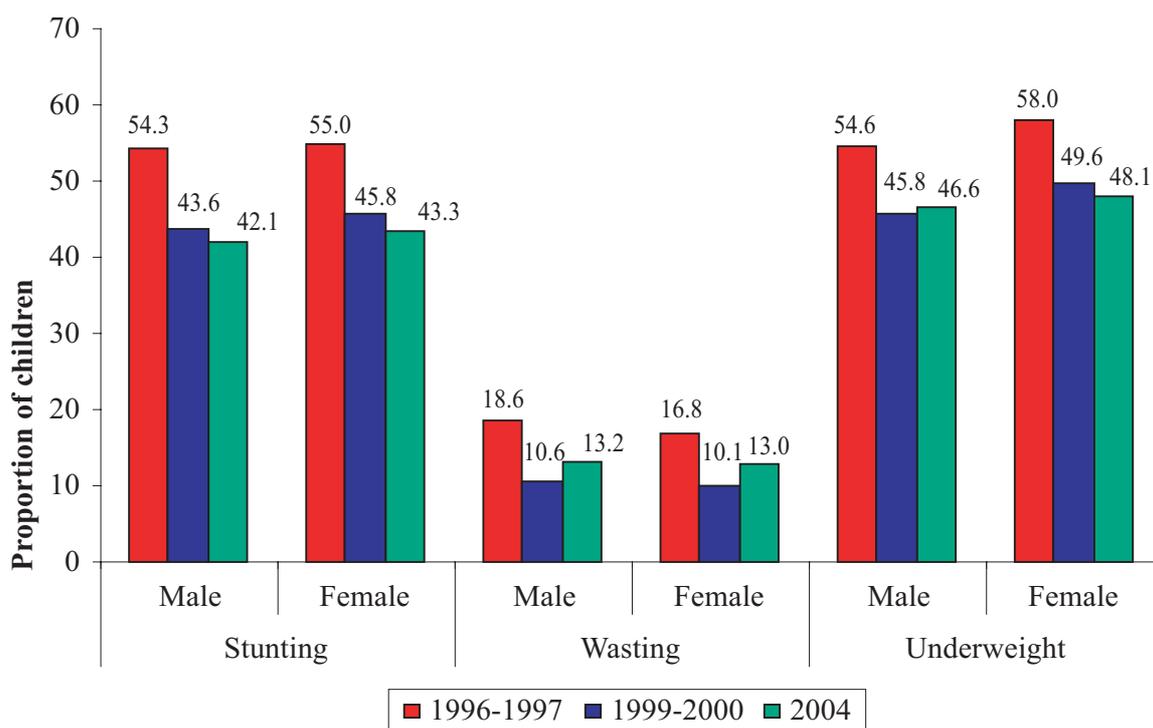
The main reason of lower prevalence of both stunting and underweight in *Khulna* division may be the gradual reduction in the rate of illiteracy for both male and female in Bangladesh. Illiteracy rate among females (age 6 years and above) in *Khulna* division gradually decreased to 33 per cent in 2004 from 51 per cent in 1993-1994 (Mitra and others, 1994; NIPORT and others, 2005). Moreover, the same pattern was found in the educational level of males (age 7 years and above) in *Khulna* (60 per cent in 1991 and 50 per cent in 2001) (BBS, 2004).

Sex of child

From the figure 17 it is clear that there was no significant variation in the prevalence of stunting, wasting, and underweight by sex over the whole period 1996-2004. The prevalence of all the indicators rapidly decreased from 1996-

1997 to 1999-2000 but no significant change was observed during the subsequent period (2000-2004). Such insignificant gender differentials in all the three forms of malnutrition indicate that there was no strong evidence of intra-household gender-bias regarding a child’s feeding and health care in Bangladesh.

Figure 17. Trends in child malnutrition by sex, Bangladesh 1996-2004



Age of child

The children of under 6 months of age are generally less malnourished due to continuous and exclusive breastfeeding compared with older children. Figure 18 shows a similar pattern in all the surveys. The level of child chronic malnutrition increases along with the age of the child as is shown in all surveys. The level of stunting decreased rapidly during the period 1996-2000 among children of all age groups except those aged less than 6 months with no significant improvement occurring in the subsequent period (2000-2004). It is clearly observed that during the entire period over half of the children aged 12-23 months suffered from chronic malnutrition. In addition, for older children the prevalence of stunting was found to be above the threshold of “very high” prevalence (WHO, 1995).

Figure 18. Trends in stunting by age of child, Bangladesh 1996-2004

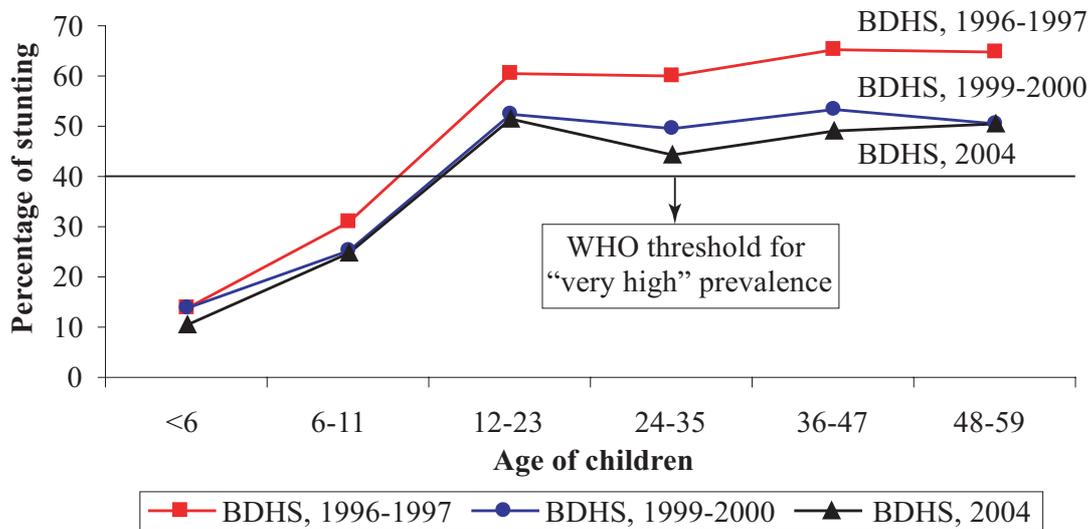
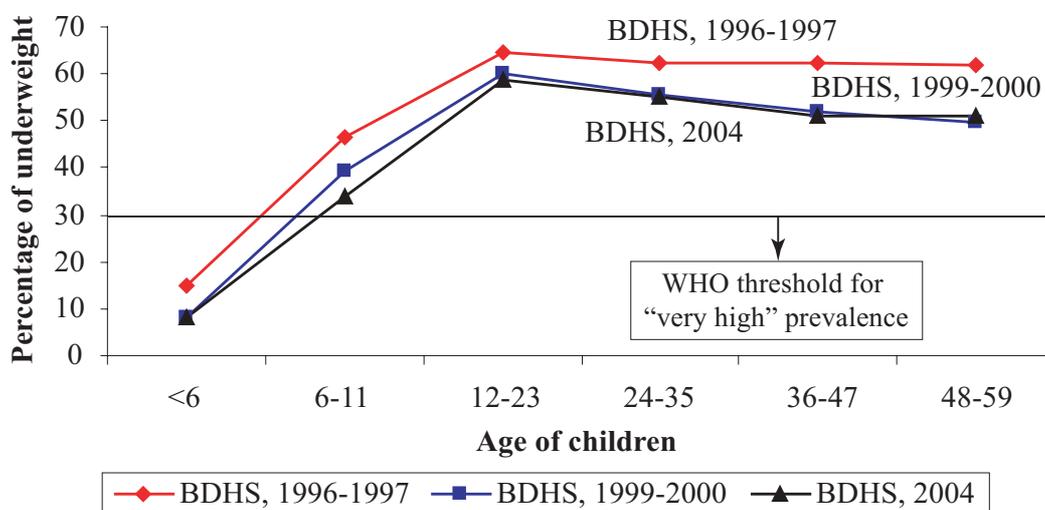


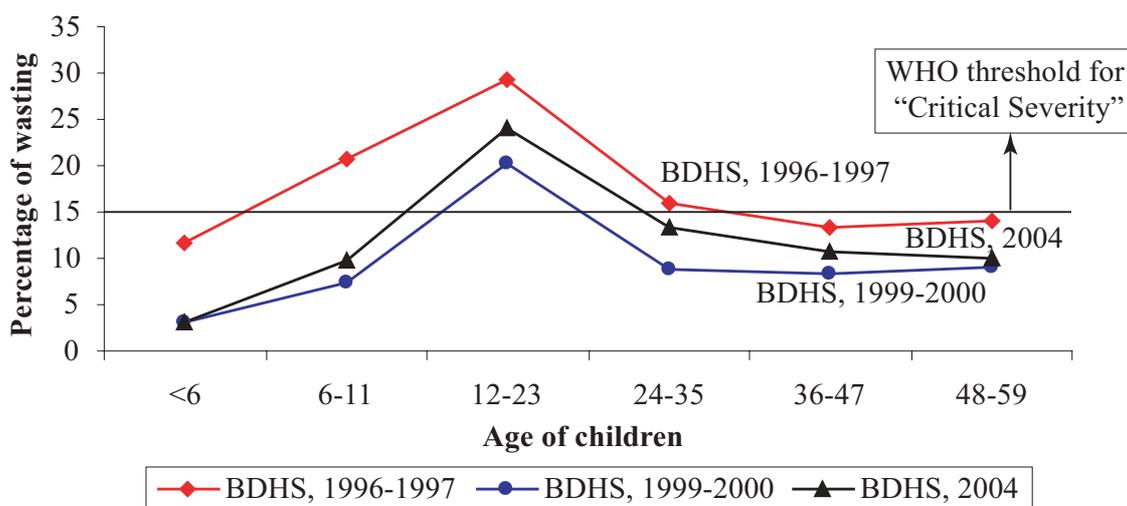
Figure 19 shows a decreasing trend in underweight during 1996-2000, which remained more or less identical during 2000-2004 for all the children. In all the three surveys, it is apparent that the level of underweight increased up to the age 12-23 months before declining very slowly. However, the prevalence of underweight for all age groups except less than 6 months was found to be above the threshold of “very high” over the entire period. These findings indicate the necessity to take appropriate childcare measures especially supplementary food for children over 6 months of age to improve their nutritional status, as well as special care for children aged 12-23 months.

Figure 19. Trends in underweight by age of child, Bangladesh, 1996-2004



It is clear from figure 20 that the children belonging to age group 12-23 months were in the “critical severity” category during the whole period 1996-2004 according to WHO as over one fifth of them were suffering from acute malnutrition. With regard to stunting and underweight, the prevalence of acute malnutrition increased up to age 12-23 months and then started to decline with age.

Figure 20. Trends in wasting by age of child, Bangladesh 1996-2004



Mother’s education

Mother’s education is one of the most important factors of child malnutrition (Rajaretnam and Hallad, 2000; Rayhan and Khan, 2006). The status of child malnutrition decreases as the mother’s educational status increases. Figure 21 also shows that the highest prevalence of child chronic malnutrition was found among the children having illiterate mothers over the whole period 1996-2004. A steady declining trend in the proportion of stunted children was observed among mothers who had completed primary education over the whole period and the level was under the cut-off point of “very high” prevalence. Though a declining trend was found in malnutrition level for children of illiterate and mothers who had not completed their primary education, the level remained above the threshold of “very high” prevalence.

Figure 21. Trends in stunting by mother's education, Bangladesh 1996-2004

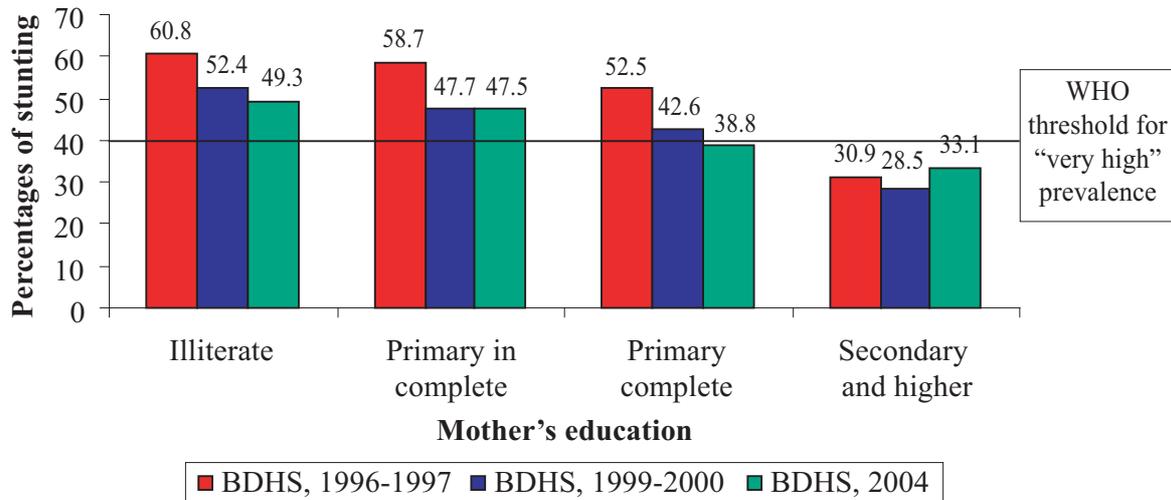


Figure 22 shows a decreasing trend in child underweight among all the educational groups of mothers over the period 1996-2004. The best picture was found among the children whose mothers had at least secondary-level education. In 2004, nearly half of children of both illiterate and primary educated mothers were found to suffer from under-nutrition, which is a situation of great concern for any country according to WHO. In case of acute malnutrition, the prevalence decreased in all the education groups from 1996-1997 to 1999-2000 but increased slightly in 2004 (figure 23). There was no remarkable variation in the prevalence of wasting by educational status of mothers in 2004.

Figure 22. Trends in underweight by mother's education, Bangladesh, 1996-2004

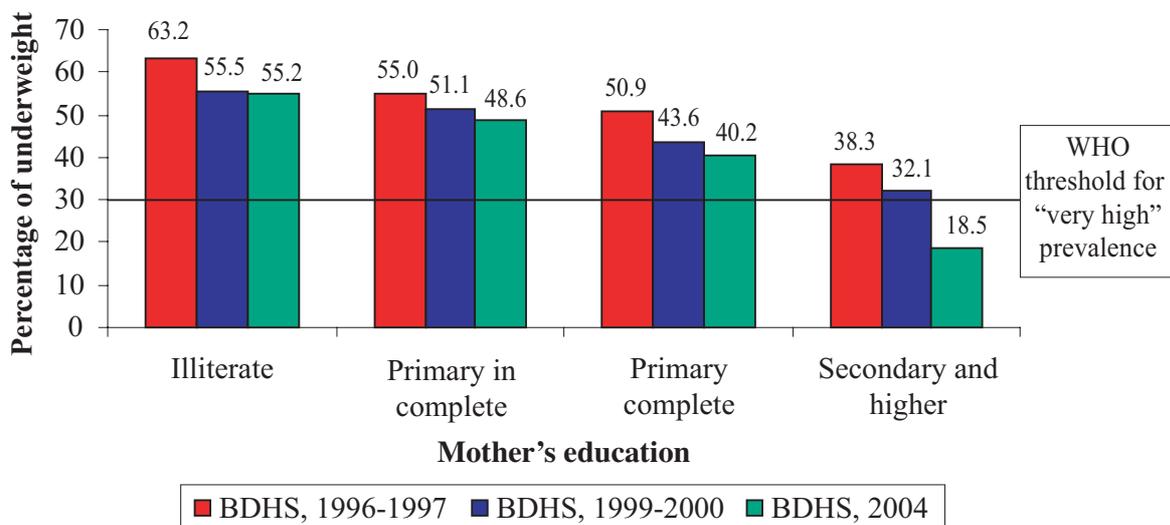
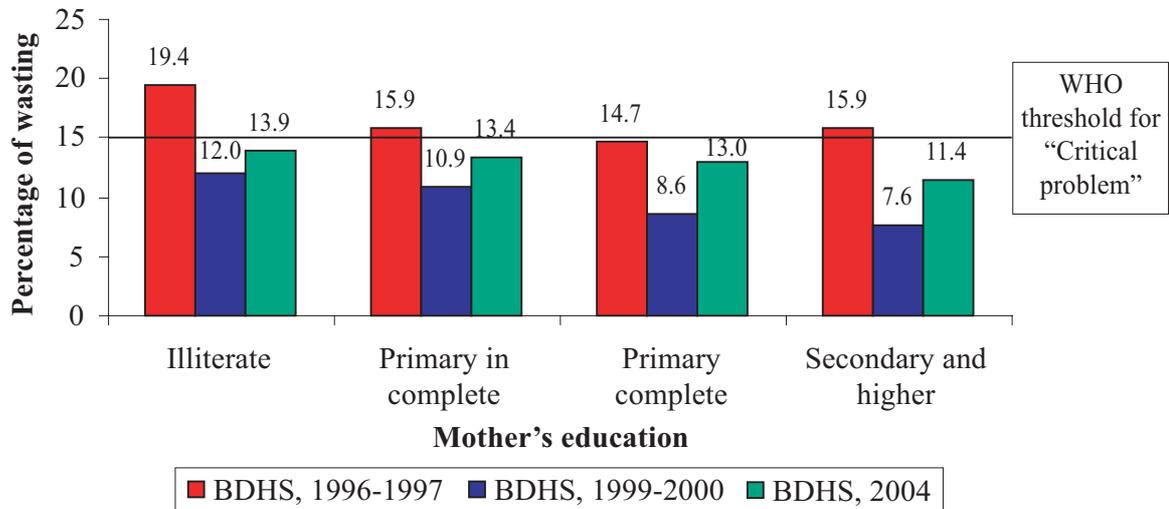


Figure 23. Trends in wasting by mother's education, Bangladesh, 1996-2004



Conclusion and recommendations

The study attempts to examine the levels and trends in malnutrition for Bangladeshi children under five years of age in terms of stunting, wasting, and underweight. According to WHO, the level of stunting and underweight children in Bangladesh was above the threshold of “very high” prevalence, which is a matter of great concern for the country and will be critical if the country is to achieve the MDGs by 2015. High prevalence of stunting and underweight has implications for both the short term, through high child mortality, and the long term, through poorer school performance, decreased work capacity and ultimately increased risk of adult morbidity and early death. The level of wasting also shows that children in Bangladesh were in “serious severity”. Moreover, nearly three fifths of children were malnourished—either stunted, wasted or underweight. Both boys and girls were equally affected. A comparison between anthropometric data (height and weight) of Bangladesh and the NCHS reference population indicates that the distance between the indicators of two data sets widened as age increased. The study of anthropometric indicators for Bangladeshi children depicts a very poor nutritional status.

The trends in child malnutrition indicate that the prevalence of stunting, wasting and underweight declined gradually over the period 1985-2004, but the level of stunting and underweight remained above the threshold of “very high” prevalence during the entire period, which reflects a terrible situation with regard to malnutrition. The situation was observed as being worse in rural than in urban

areas. The prevalence of stunting, wasting and underweight varied over the entire period according to the specific region in the country, stunting and underweight was found to be declining in *Khulna* division; by contrast, the prevalence of wasting was found to decline in *Barisal* division, but stunting and underweight were found to be high, indicating that the children of *Barisal* division were suffering more from chronic malnutrition than acute malnutrition.

The trends in age-specific child malnutrition indicate that, though the prevalence of both stunting and underweight for younger children (aged 12-59 months) declined over the period 1996-2004, the levels remained above the threshold of “very high” prevalence. Children aged 12-23 months were at greater risk of being malnourished in terms of all the three forms throughout the whole period. For children whose mothers had no education or incomplete primary education, the level of stunting and underweight decreased but remained far above the threshold. Only for the children born to higher educated mothers, the prevalence of stunting, wasting and underweight fell below the threshold. These findings indicate that children of less educated mothers seriously suffer from all the three forms of malnutrition while higher education of women helps significantly to reduce the incidence of malnutrition.

Based upon these findings the study suggests that special efforts are required to reduce the nutrition vulnerability among younger children, especially those aged 12-23 months. An appropriate strategy should be employed to educate people about the importance of balanced complementary food for infants over six months of age. Special nutrition interventions should be undertaken in rural areas, more specifically in *Barisal*, *Sylhet* and *Chittagong* divisions. The interventions for improving girls’ education should be strengthened since women’s education is a powerful weapon for reducing child malnutrition. Better knowledge and skills enable women to improve the way they care for and feed their infants. Monitoring the appropriate child growth chart for Bangladeshi children at least during the first five years of life may help the parents to become aware of the nutritional status of their children. In this regard, the Government of Bangladesh, in collaboration with non-governmental organizations, can set up a long-term programme to facilitate measuring instruments and education of people about the appropriate standard height and weight of children. Moreover, it is indispensable to strengthen the existing nutrition education programmes and introduce new programmes in the pursuit of the Millennium Development Goals by 2015.

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Population Ageing in the Pacific Islands: Emerging Trends and Future Challenges

The primary responsibility for developing national action plans and strategies to address population ageing lies with national governments, but international agencies, non-governmental and civil society organizations can all play a part in supporting government efforts.

By Geoffrey Hayes*

At the beginning of the twentieth century, most Pacific islands were still recovering from the high death rates that followed from the introduction of new diseases into the region in the eighteenth and nineteenth century and therefore had low rates of population growth. Some countries did not recover from high mortality until the 1930s, and colonial authorities were content with increasing fertility as it signalled a return to population health. However, fertility rates accelerated for several decades until by the 1970s the total fertility rate (TFR) had reached 7 children per woman or even higher in some countries/areas. Rapid social

* Consultant, UNFPA Pacific Subregional Office, e-mail: Geoffrey@hotmail.com.

change and increasing government support for family planning resulted in the TFR falling steadily over several decades so that by the beginning of the twenty-first century several countries had TFRs below 3.

The “momentum” created by earlier rates of high population growth has resulted in a distinctive “youth bulge” in the present age distributions of many Pacific countries and areas. The youth population has continued to grow even though individual fertility has declined substantially in recent years. Age distributions in the Pacific are consequently narrowing at the base and widening in the adult age range, while still remaining very narrow at the top. However, the process of ageing is already occurring and the median age of many Pacific island populations is beginning to rise.

The primary purpose of this paper is to describe a current picture of ageing patterns in the Pacific at both the subregional and individual country levels and employ population projections to provide insights into the likely future trends of population ageing in the subregion. The overall purpose is to assist countries and areas in preparing for a future in which the elderly comprise a much larger proportion of the population. The primary focus is on the 15 United Nations programme countries/areas, although the analysis includes the ageing situation in the dependent territories of France and the United States of America.¹

In the present study, the older population is defined as persons aged 60 years and over, and most of the analysis presented in this paper refers to this group. Because the older population is also ageing, however, reference is also made to the “oldest old”, defined as persons aged 80 years and over.

The paper is organized into five sections. In the second section, sources of data and geographical areas are reported. The third section presents a picture of recent and projected ageing trends in all the Pacific island countries/areas along with a brief description of global and regional pattern of ageing. The demographic impact of an ageing population is described in the subsequent section. The final section provides conclusion and policy implications.

Data sources and geographical areas

The demographic data employed in this paper are derived from two main sources: (a) the United Nations Department of Economic Affairs (UNDESA) publication *World Population Ageing 2007*² (United Nations, 2007); (b) population projections for each Pacific island country carried out by the UNFPA Subregional

Office for the Pacific for the purposes of this study.³ The specific source used is identified, as appropriate, in the table or text. Where available, UNDESA figures have been employed, but the UNDESA series of projections does not include separate projections for countries with populations below 100,000, and more than half of the countries in the Pacific islands fall into this category. To obtain country-level data for the smaller countries, it was therefore necessary to perform separate population projections of those individual countries for which UNDESA projections are not available.⁴

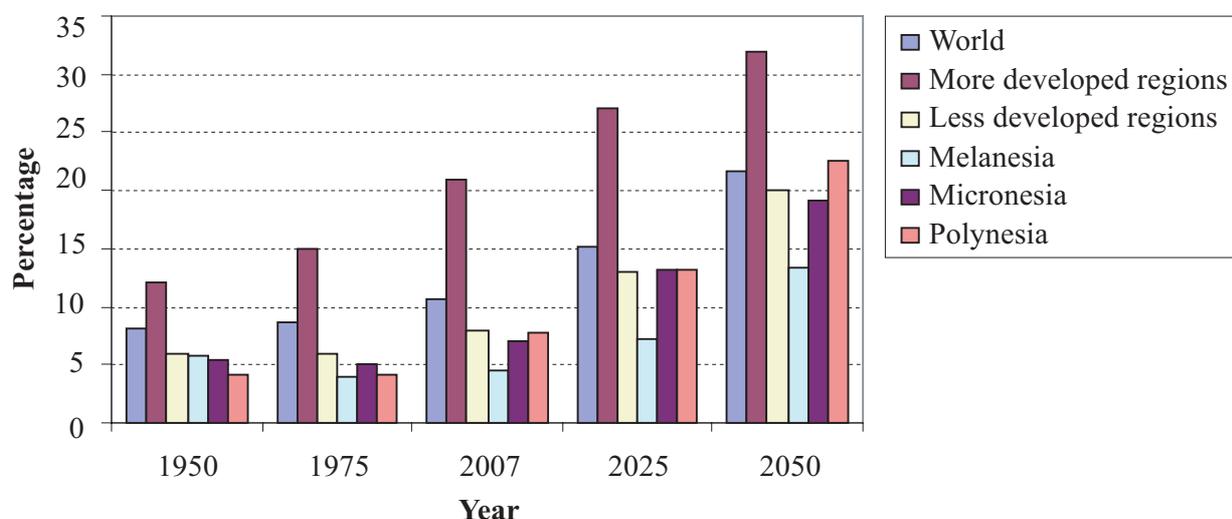
Unless otherwise noted, the designation “Pacific island countries” or “Pacific islands” refers to the sum of the three main culture areas of the Pacific, namely Melanesia, Micronesia and Polynesia. Those designations are primarily geographical but are derived from early ethnographic distinctions that predated the immigration of Europeans and Asian into the Pacific. Thus, “Melanesia” includes a large European population resident in New Caledonia and a significant ethnic Indian population in Fiji. Those ethnic distinctions have implications for population ageing because the demographic transition among these groups has followed a different pattern than among those who are indigenous to these countries.⁵

Population ageing in the Pacific island countries

Trends: changing and projected proportion of older persons

In global terms the contribution of the Pacific islands region to the total number of elderly in the world is miniscule, simply because the Pacific contains less than 1 per cent of the world’s total population. In local terms, however, the expected increase in the absolute number of elderly over the next several decades is substantial. The total number of older persons in the Pacific islands in 2000 was approximately 376,000 in 21 countries and territories.⁶ By 2030, the number of older persons are projected to reach one million and by 2050 will double again to 2.2 million—an increase of 600 per cent. The overwhelming majority (88 per cent) will be in Melanesia, 6.4 per cent will be in Polynesia and 5.8 per cent in Micronesia. Yet, Melanesia lags well behind in terms of population ageing because of its late entry into the demographic transition and its economically less developed status. By 2050, when almost 22 per cent of the world’s population is expected to be aged 60 and over (figure 1), the lowest proportion of the older population will belong to Melanesia (13.3 per cent), followed by Micronesia (19.2 per cent) and Polynesia (22.5 per cent).

Figure 1. Percentage of population aged 60 and over by region, 1950-2050



Source: United Nations, 2007.

Note: The parent support ratio is normally calculated using the population aged 85 and over per 100 persons aged 50-64. For the Pacific island countries, the ratio has been calculated using the 80 and over population per 100 persons aged 45-59 because of the difficulty of obtaining data on the population aged 85 and over.

Pacific island countries vary widely in the patterns of ageing to date and the expected trends over the next several decades. As of 2000, the countries/areas with the highest proportion of persons aged 60 and over (table 1) are the small Polynesian countries whose populations are significantly affected by international migration, but in the context of declining fertility and mortality. However, these are not necessarily the same countries that will have a high proportion of older persons by 2050. The populations of those small countries, and their age structures, are significantly affected by variations in migration patterns; thus it is difficult to predict what age structure will emerge over several decades.

Table 1. Population ageing in Pacific island countries and territories*

Country	Percentage of older persons (60 years and over) ^a		
	2000	2025	2050
Niue	14.5	21.1	21.3
Cook Islands	10.0	15.5	22.8
Tokelau	9.0	11.1	16.2
Tuvalu	8.6	14.6	17.4
<i>New Caledonia</i>	8.6	18.1	24.1

Table 1. (continued)

Country	Percentage of older persons (60 years and over) ^a		
	2000	2025	2050
<i>Guam</i>	8.2	15.4	22.0
Tonga	7.9	9.7	12.6
Palau	7.8	23.3	24.9
<i>Wallis and Futuna</i>	7.7	14.4	23.0
<i>French Polynesia</i>	7.3	16.2	23.3
Samoa	6.5	12.1	20.3
Fiji	6.0	12.6	16.6
Kiribati	5.4	8.2	18.4
<i>American Samoa</i>	5.4	11.2	14.2
Federated States of Micronesia	5.3	10.2	16.2
Vanuatu	5.0	7.6	12.4
Solomon Islands	5.0	5.9	11.0
Papua New Guinea	4.0	6.1	11.3
Marshall Islands	3.4	6.4	11.6
<i>Northern Mariana Islands</i>	2.7	17.8	22.9
Nauru	2.6	7.9	13.4

Source: UNFPA Population projections, 2008.

* Countries shown in italics in this table are dependent territories of France or the United States of America.

^a Ranked by median age in 2000 in descending order.

Based on projected trends, however, the highest proportions of older persons will be found in the territories of New Caledonia, French Polynesia, Wallis and Futuna, the Northern Mariana Islands and Guam, as well as Palau and the Cook Islands. The factors that contribute to ageing in these populations differ from country to country. New Caledonia, for example, receives migrants from France, French Polynesia and Wallis and Futuna, and those migrants tend to be either of working age or retirees. Northern Mariana Islands has experienced significant immigration from Asia but this migration flow is set to reverse with expected changes in the garment industry. Palau has experienced a sharp decline in fertility while the Cook Islands have had several decades of net emigration of persons in the working age range as well as steadily declining fertility.

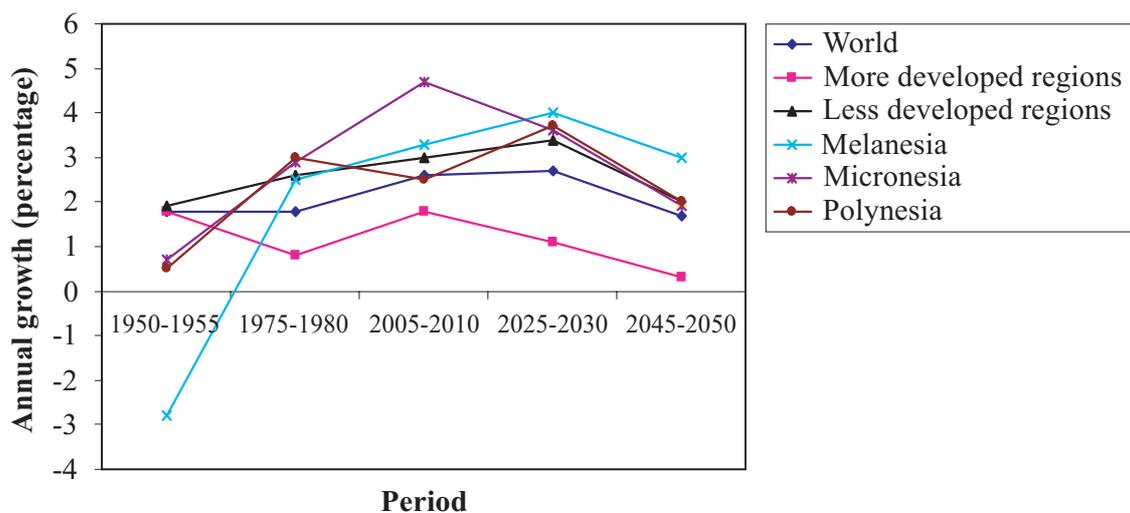
With the notable exception of New Caledonia, which is a special case owing to its large “European” population, Melanesian countries have the smallest proportion of older persons both currently and projected into the future, but the

population of older persons will nevertheless treble in Papua New Guinea, Solomon Islands, Fiji and Vanuatu between 2000 and 2050.

Pace of population ageing

In the Pacific, the pace of ageing was already above the world average in the late 1970s and is beginning to accelerate further. At a global level, the rate of growth of the old population is currently 2.6 per cent annually and this rate is expected to rise slightly to 2.7 per cent over the next two decades (figure 2). In the present decade, Melanesia and Micronesia are ageing more rapidly than the world as a whole or the less developed regions. In Micronesia, the current rate of growth in the elderly population (4.7 per cent) is well above global or less developed region levels. In Melanesia, the peak rate of growth in the elderly population will not occur until the 2025-2030 period when the annual growth rate is expected to reach 4.0 per cent. This will also be the peak period for Polynesia.

Figure 2. Rate of growth in the 60 and over population, 1950-2050



Source: United Nations, 2007.

The rates at which the older population in Pacific island countries is currently growing vary widely both between countries and through time. As table 2 shows, the older population has recently (2000-2005) been growing at more than 3 per cent per year in nine countries. Predominant among those are the metropolitan territories, largely because it is in these territories that the fertility and mortality transitions are the most advanced. The slowest growth rates among the older population are presently found in the smaller Polynesian and Micronesian countries that are already heavily affected by international migration and already have

a relatively high proportion of elderly. In some of these countries, high rates of growth among the old will come in the future (between 2010 and 2025), whereas in others the rate of growth will start declining around this time. In the western Melanesian countries of Papua New Guinea, Vanuatu and Solomon Islands, the rate of growth in the older population is high because all groups are growing rapidly; but beginning in the period 2010-2015, the growth rate of the older population is projected to increase rapidly and will exceed the overall growth rate by a considerable margin.

Table 2. The pace of population ageing in Pacific island countries and territories*

Country	Rate of growth of the older population (annual percentage increase)				
	2000-2005	2010-2015	2020-2025	2030-2035	2040-2045
<i>Northern Mariana Islands</i>	6.3	8.1	6.3	3.7	-2.7
Nauru	5.4	6.8	3.2	3.0	2.6
<i>Wallis and Futuna</i>	4.9	3.0	2.0	1.5	3.5
<i>New Caledonia</i>	4.3	3.9	3.5	2.4	1.7
<i>French Polynesia</i>	4.1	4.7	4.4	1.9	1.7
<i>American Samoa</i>	4.0	4.7	4.3	1.7	0.9
Fiji	3.6	3.9	3.0	0.8	1.3
<i>Guam</i>	3.4	4.8	3.1	2.3	1.3
Vanuatu	3.3	4.4	4.2	3.2	3.0
Papua New Guinea	2.5	3.9	4.9	4.3	3.7
Solomon Islands	2.4	3.3	4.6	5.2	3.9
Tokelau	2.3	-0.8	0.9	0.4	0.2
Cook Islands	2.1	1.4	3.0	0.7	1.2
Samoa	2.0	3.0	3.8	2.7	0.6
Kiribati	1.9	3.3	4.4	2.1	3.4
Palau	1.7	5.3	4.5	1.8	-0.5
Marshall Islands	1.2	5.5	2.8	0.4	5.6
Tonga	0.9	0.9	1.2	1.1	1.9
Tuvalu	0.1	3.5	2.4	-0.8	1.4
Niue	-0.3	1.1	0.3	-0.1	-0.4
<i>Federated States of Micronesia</i>	-0.3	4.8	2.7	0.3	3.9

* Countries shown in italics in this table are dependent territories of France or the United States of America. Countries are ranked by rate of growth in 2000-2005.

Source: UNFPA Population projections, 2008.

Growth rate of the population 80 years and over, 1990-2050

Higher survival to age 60 years also implies higher survival to ages above 60 years. Thus the older population can also be expected to get older, just as the total population is ageing. The ageing of the elderly population is measured by the growth rate of the “oldest old” (80 years of age and over). It is apparent from table 3 that, at the global level, the “oldest old” population is currently growing at a high rate (3.9 per cent per year) and that the rate of growth in this age group will continue at a fast pace through to 2050. By the period 2045-2050, however, the rate of growth will have dropped to 1 per cent in the more developed regions but will have reached 3.9 per cent in the less developed regions.

Table 3. Growth rate of the population 80 years of age and over, 1950-2050

Region	1950-1955	1975-1980	2005-2010	2025-2030	2045-2050
World	3.1	2.7	3.9	3.8	3.0
More developed regions	3.2	3.6	3.3	3.1	1.0
Less developed regions	2.9	1.4	4.6	4.4	3.9
Pacific islands					
Melanesia	2.5	2.5	2.8	5.4	4.8
Micronesia	-2.6	4.7	3.9	7.1	3.7
Polynesia	-1.0	2.1	3.5	3.2	4.3

Source: United Nations, 2007.

In the Pacific, very rapid increases in this age group can be expected to occur in the coming decades. In Melanesia, 5.4 per cent annual growth in the 80 and over population can be expected by 2025, and this group would still be increasing at 4.8 per cent per year two decades later. Both Micronesia and Polynesia will have rapid increases in this age group through to 2050.

The effects of such rapid growth rates are apparent in table 4, which shows that the population aged 80 and over in the Pacific region will increase from about 19,000 in 2000 to 266,400 by 2050. This represents a 14-fold increase over 50 years or an average annual growth rate of over 5 per cent.

Table 4. Projected population 80 years and over in the Pacific, 2000-2050

	2000	2010	2020	2030	2040	2050
Melanesia	14 782	24 805	38 155	63 248	118 425	223 352
Micronesia	1 912	3 248	4 691	7 952	13 964	20 115
Polynesia	2 193	5 247	7 681	11 134	17 900	22 966
Total Pacific	18 887	33 300	50 527	82 334	150 289	266 433

Source: UNFPA population projections, 2008.

The demographic impact of ageing

The demographic impact of rapid population ageing can be measured by a variety of indicators that reflect different dimensions of the age composition of the population. This section presents changing age structures employing graphical representation (age pyramids) and various indices, including the ageing index, the median age, the potential support ratio and the parent support ratio. Each of these indicators measures a different aspect of ageing.

The changing age structure

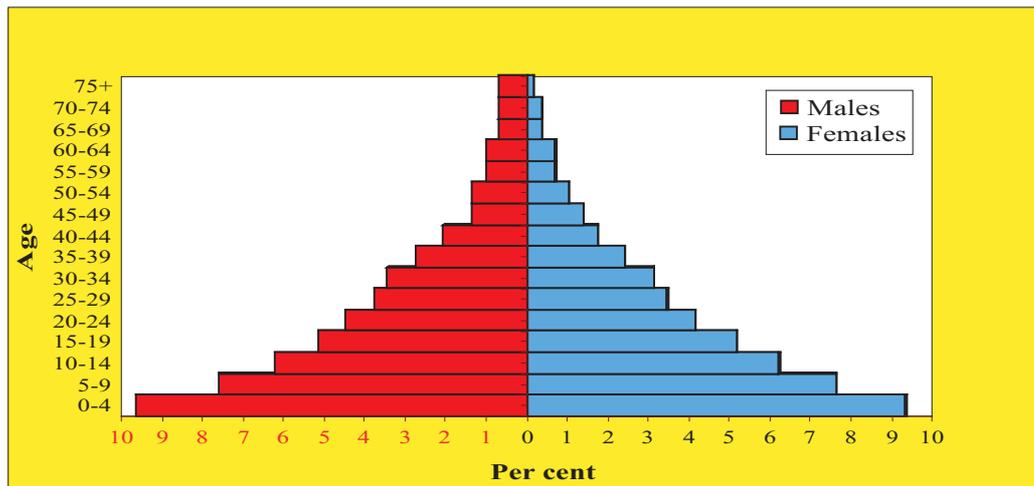
Figures 3-5 show the age pyramid at three points in time for Fiji—1950, 2000 and 2050—to illustrate this point. The 1950 pyramid (figure 7) has the classic shape of a population experiencing rapid population growth due to high fertility—as evident in the very wide base of the pyramid. The median age in 1950 was 16.6 years, reflecting a very young population. By 2000, however, the median age had increased to 22.6 years (figure 4) and the effects of declining fertility were apparent in the shrinking share of the population aged less than 15 years.

Projected to 2050 assuming a continuation of recent trends (figure 6), the Fiji population would have a median age of 39.4 years and the age pyramid would have a very different shape with almost vertical sides and a widening at the top, especially for females. This age distribution and high median age is typical of the populations of the more developed countries at the present time.

Figures 6 and 7, which graph the changing relationship between the number of children and the number of older persons in French Polynesia and Palau, respectively, show the typical trends in countries undergoing the demographic transition. Figure 8, shows the projected pattern in Vanuatu, a country in which

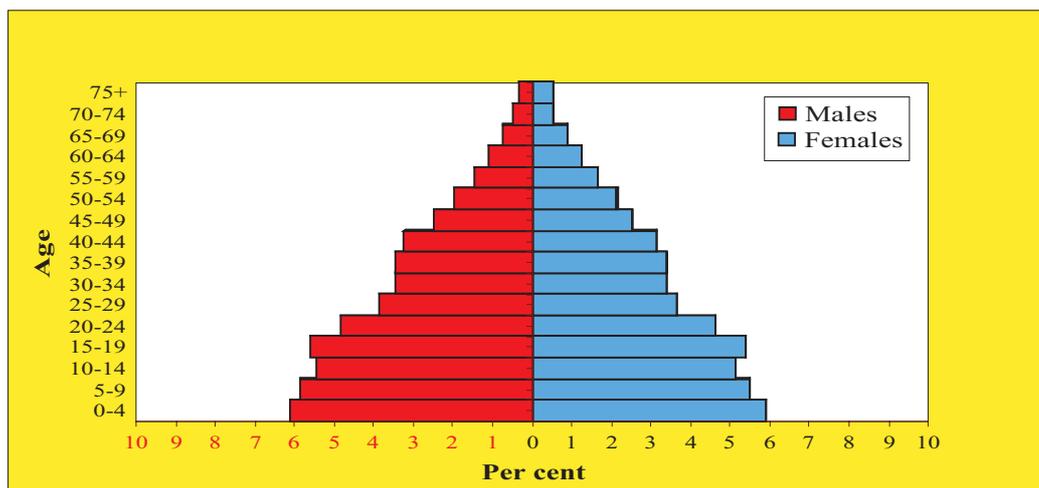
the demographic transition is proceeding slowly with persistently high fertility over several decades. In this case, the population of children aged 0-14 is projected to continue growing throughout the first half of the twenty-first century even as the number of old persons rises as well, thus increasing the overall burden of dependency.

Figure 3. Population pyramid of Fiji 1950: median age 16.6 years



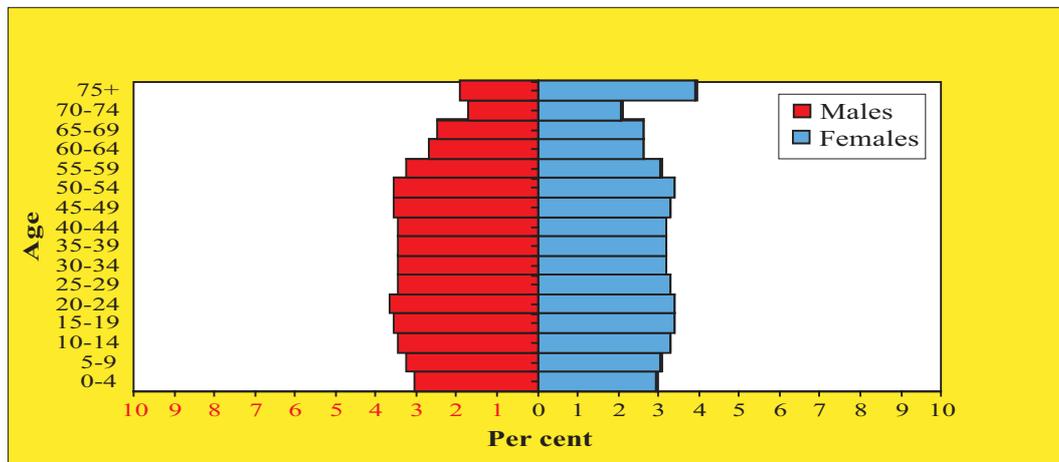
Source: Fiji Bureau of Statistics, Census Reports.

Figure 4. Population pyramid of Fiji 2000: median age 22.6 years



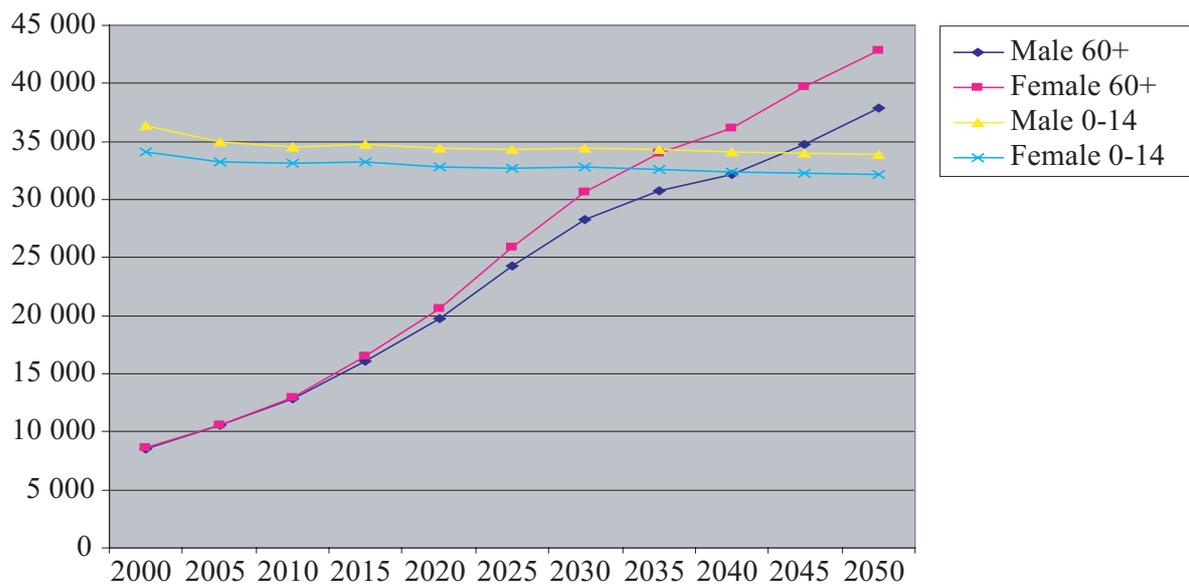
Source: UNFPA Population projections, 2008 (base year).

Figure 5. Population pyramid of Fiji 2050: median age 39.4



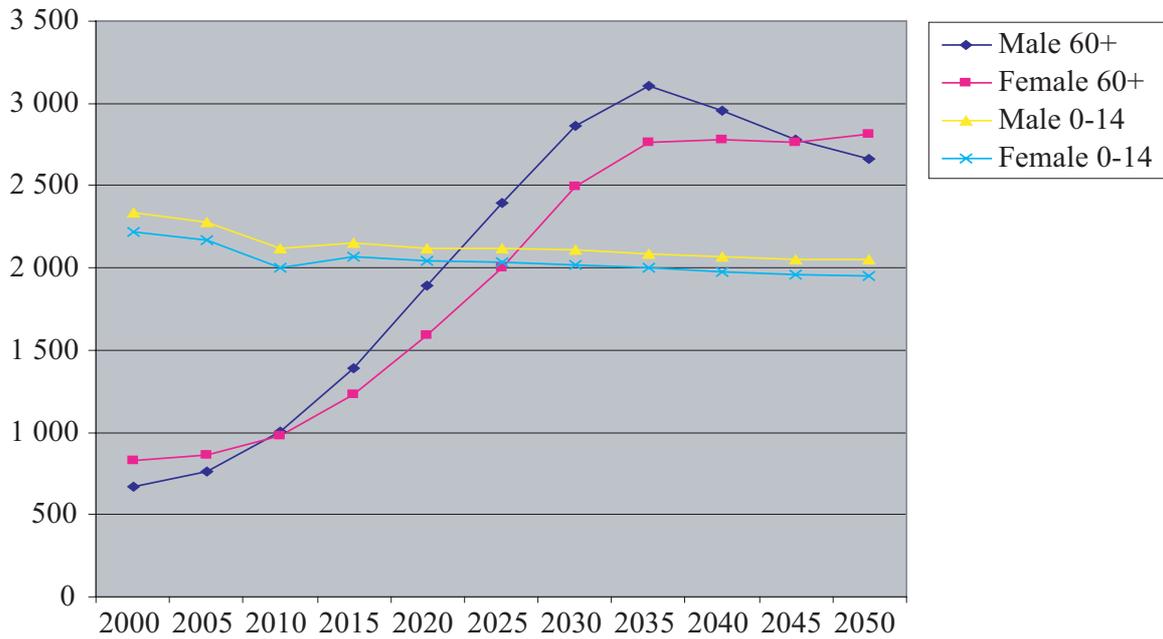
Source: UNFPA Population projections, 2008.

Figure 6. Projected changes in age groups 0-14 and 60 and over in French Polynesia, 2000-2050



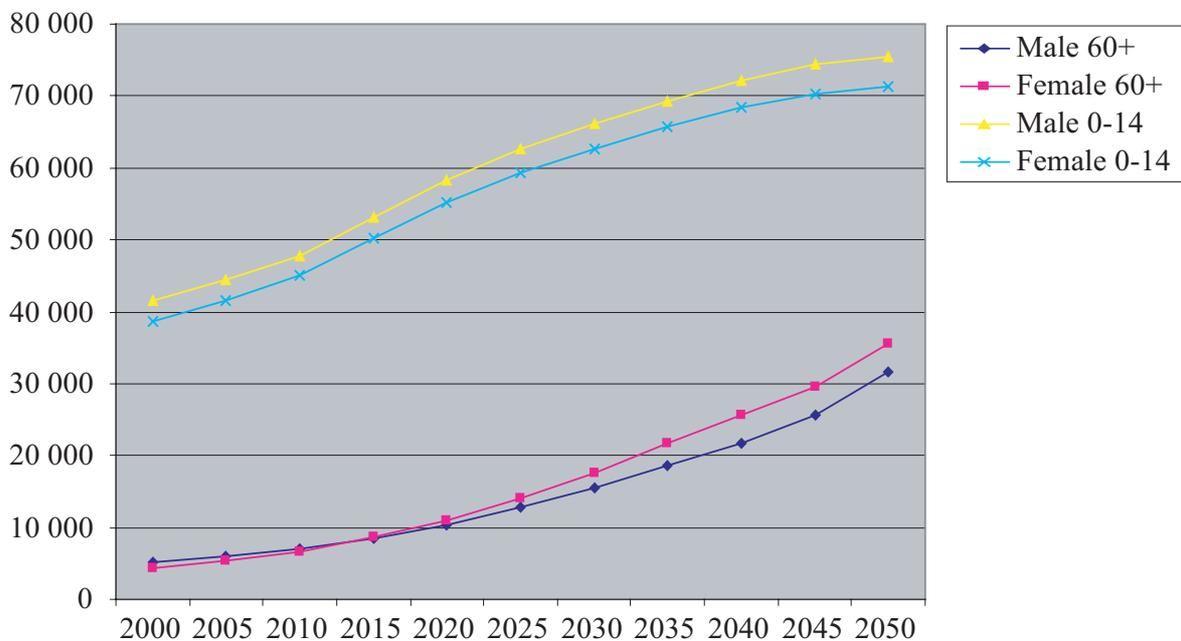
Source: UNFPA Population projections, 2008.

Figure 7. Projected changes in age groups 0-14 and 60 and over in Palau, 2000-2050



Source: UNFPA Population projections, 2008.

Figure 8. Projected changes in age groups 0-14 and 60 and over in Vanuatu, 2000-2050



Source: UNFPA Population projections, 2008.

The social and economic challenges of population ageing will be formidable in all regions of the world, including the Pacific islands. For most of the twentieth century, the rapid growth of youth powered by high fertility rates over several decades was the primary challenge faced by Governments. Accommodating the growing numbers of young people required the rapid expansion of educational and training institutions and a concerted effort to increase the supply of jobs. The momentum of population growth caused by the youth “bulge” has kept the focus of health care on children and youth. In the twenty-first century the rapid pace of ageing will bring quite different challenges, especially among Pacific island countries/areas with their far-flung islands suffering from poor communications and transport and low incomes.

The ageing index

The ageing index refers to the number of older persons per 100 persons under the age of 15. An index of 100 means that the number of persons over 60 is equal to the number of children aged 0-14. An index above 100 means that there are more older persons in the population than there are children. Given present ageing trends, the world ageing index will reach 100 in 2050 (table 5), after which it can be expected to continue rising. In the more developed regions the index reached 100 in the late 1990s and by 2050 it will be over 200. In other words, there will be twice as many older persons in the population as children under 15.

Table 5. Indicators of changing age structure in Pacific island countries, 1975-2050

Region/Country ^a	Ageing index				Median age			
	Older persons per 100 persons aged less than 15 years				Years			
	1975	2000	2025	2050	1975	2000	2025	2050
World			61.5	100.5			32	36
More developed regions			187.7	215.3			44	46
Less developed regions			48.2	88.6			30	35
Pacific islands								
Melanesia			24.0	59.9			26	33
Micronesia			48.6	92.2			29	36
Polynesia			51.7	119.5			30	39

Table 5. (continued)

Region/Country ^a	Ageing index				Median age			
	Older persons per 100 persons aged less than 15 years				Years			
	1975	2000	2025	2050	1975	2000	2025	2050
Country/territory								
Palau	--	32.9	105.6	136.6	--	31	38	40
<i>Northern Mariana Islands</i>	--	<i>12.1</i>	<i>102.3</i>	<i>136.4</i>	--	29	35	43
Niue	--	49.1	91.2	99.3	--	29	36	37
<i>Guam</i>	<i>10.2</i>	<i>27.0</i>	<i>68.0</i>	<i>113.4</i>	<i>21</i>	27	32	38
<i>New Caledonia</i>	<i>15.5</i>	<i>29.4</i>	<i>78.2</i>	<i>135.5</i>	<i>21</i>	27	35	41
<i>French Polynesia</i>	<i>11.5</i>	<i>24.2</i>	<i>74.8</i>	<i>122.3</i>	<i>19</i>	26	34	39
Cook Islands	--	29.4	63.5	123.9	--	25	32	41
Fiji	11.2	18.3	45.0	74.0	19	24	27	33
Tuvalu	--	23.9	51.1	84.6	--	24	29	36
<i>Wallis and Futuna</i>	--	<i>21.9</i>	<i>60.3</i>	<i>120.5</i>	--	22	32	39
<i>American Samoa</i>	--	<i>14.0</i>	<i>36.5</i>	<i>64.9</i>	--	21	26	33
Tonga	8.6	20.5	29.8	57.4	17	20	29	34
Papua New Guinea	8.5	10.0	20.8	53.1	18	20	23	29
Kiribati	--	13.4	27.1	74.9	--	20	26	39
Nauru	--	6.6	26.5	61.5	--	20	26	33
Tokelau	--	24.0	46.6	107.2	--	20	28	42
Samoa	7	15.7	38.7	95.2	17	19	28	39
Solomon Islands	10.2	12.2	19.1	63.9	16	19	22	28
Vanuatu	9.7	11.7	24.2	64.9	17	19	23	29
Federated States of Micronesia	--	13.1	36.2	79.5	--	19	26	37
Marshall Islands	--	7.8	18.3	51.1	--	18	22	32

Source: UNFPA Population projections, 2008.

Note: ^a Countries shown in italics are territories of France or the United States of America. Countries are ranked by median age in 2000.

The ageing index will not reach 100 in the less developed regions until some time after 2050, and this is also the case with Melanesia and Micronesia. In Polynesia, however, the ageing index will reach 100 around 2040. The ageing index is currently highest in the small Micronesian and Polynesian countries. By 2050 the index will reach 100 in 11 countries, but it will remain under 100 in such high fertility populations as Marshall Islands, the Federated States of Micronesia and Solomon Islands for several decades to come.

Median age

The median age is a simple index of ageing and the relationship between age groups which is rising at a global level and in all world regions and is expected to reach 36 years by 2050. By that time, the median age in the more developed regions will be 46 years, an unprecedented level. Even today's less developed regions will reach a median age of 35 by 2050. In the Pacific, the expected trends are close to the less developed regions as a group, although Polynesia will likely reach 39 years by 2050, 3-6 years older than Micronesia and Melanesia, respectively. In all regions, the rate at which the median age is rising is itself rising. In Polynesia, for example, the median age increased by six years between 1950 and 2000, but will increase by another 16 years between 2000 and 2050. This is yet another indication of the accelerating pace of ageing.

In 1975, many Pacific countries had very young populations with a median age between 16 and 19 years. By 2000, the median age had reached 31 years in Palau, 29 years in Northern Mariana Islands and Niue, and 27 years in Guam and New Caledonia. The median age is projected to increase in all Pacific countries over the next several decades. Several countries, including Cook Islands, Tokelau Islands, Palau, New Caledonia and Northern Mariana Islands will have a median age over 40 by 2050, similar to the level projected for Thailand.

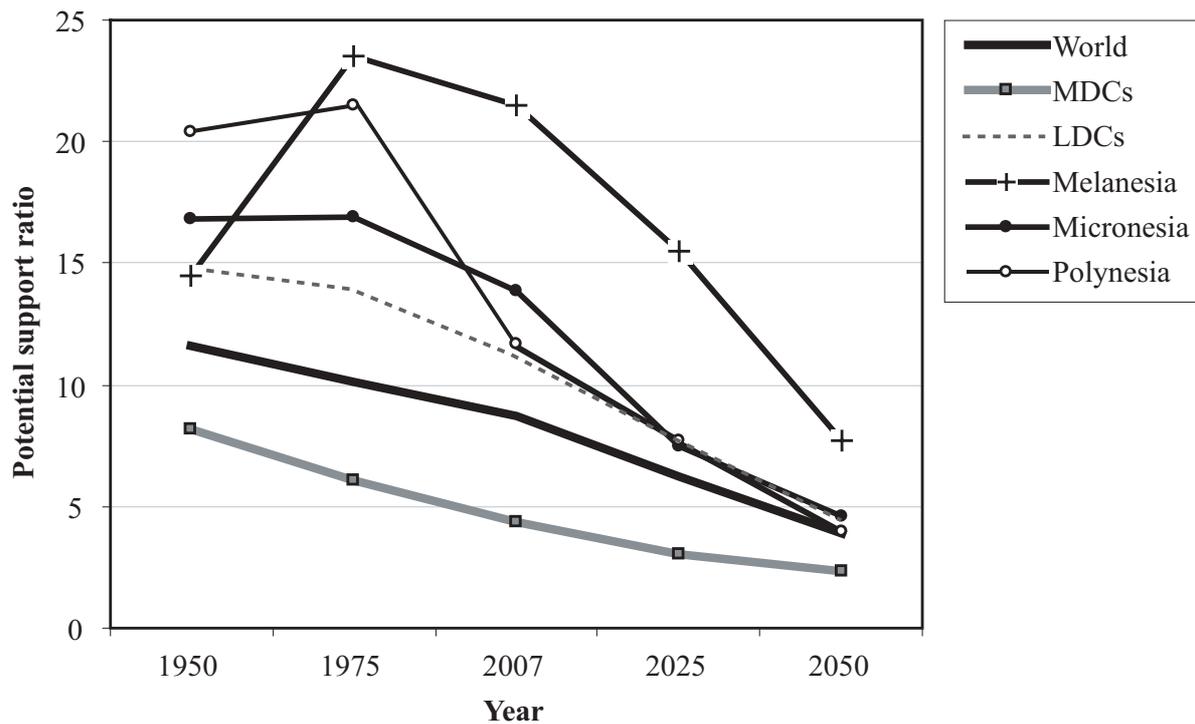
Potential support ratio

Two measures of old age dependency are: the "potential support ratio" and the "parent support ratio". The former measures the ratio between the number of working age persons (aged between 15-64) and persons aged 65 and over. The higher this ratio, the more "workers" there are relative to non-workers. A falling potential support ratio indicates that the population not working and aged 65 and over is rising relative to the population aged 15-64, thus increasing the "burden" on the working population. The measure is a simple demographic one that does not allow for the possibility that some persons aged 15 and over are not working or that some persons aged 65 and over are continuing to work. Nevertheless, it gives a valid indication of the impact and implications of an ageing population.

Figure 9 compares the actual and expected trends in the potential support ratio over the period 1950 to 2050 between various regions around the world, including the Pacific. It is clear that this ratio is declining at a rapid rate in the less developed regions but at a much more moderate rate in the more developed regions. In the Pacific islands, the Polynesian subregion shows a very rapid decline

in this ratio but it converges with that of Micronesia by 2025. In Melanesia, the potential support ratio rises to a high level by 1975 because of high fertility, but thereafter begins to decline at a rapid rate. In Polynesia and Micronesia, the potential support ratio will decline to the world average by 2050 but will be marginally higher than in the more developed regions.

Figure 9. Potential support ratio, 1950-2050



Source: United Nations, 2007.

Table 6 shows that the potential support ratio is projected to fall in almost all Pacific countries and areas. The exceptions are Niue, Tokelau and Tonga. Elsewhere, the ratio will decline, meaning that there will be fewer persons of working age relative to the number of elderly.

Parent support ratio

The parent support ratio measures the ratio between the oldest-old (80 years and older) and their children, assumed to have been born 45-59 years previously, on average.⁸ The parent support ratio is also a demographic measure: it does not refer to persons who are actually related but is merely an approximation of the family support that might be available.

Table 6. Indicators of age dependency in Pacific island countries/areas, 2000-2050*

Country	Potential support ratio (population aged 15-64/ population aged 65 and over)			Parent support ratio (population aged 80 and over/ population aged 45-59 x 100)		
	2000	2025	2050	2000	2025	2050
<i>Northern Mariana Islands</i>	58.4	6.9	4.8	3.3	3.5	38.3
Palau	13.0	6.0	4.6	0.0	5.3	26.6
Nauru	13.0	6.0	4.6	0.0	5.3	26.6
Niue	6.5	5.0	7.0	0.0	21.8	22.3
Cook Islands	10.6	8.0	5.9	6.1	14.1	19.9
<i>French Polynesia</i>	16.2	7.4	4.9	4.3	8.1	19.5
<i>New Caledonia</i>	13.9	7.5	4.6	6.7	8.9	18.7
<i>Guam</i>	13.7	7.5	5.2	4.5	8.3	18.6
Samoa	12.4	9.4	5.8	0.0	9.0	18.1
Tokelau	9.2	7.9	9.1	9.0	21.2	16.8
<i>Wallis and Futuna</i>	12.0	7.8	5.3	0.0	14.2	16.7
Fiji	17.1	8.8	7.4	0.0	8.0	16.3
Tuvalu	11.7	7.1	7.8	5.2	10.5	13.3
<i>American Samoa</i>	20.1	9.7	9.3	4.0	7.4	11.9
Vanuatu	20.5	14.5	9.7	8.3	6.2	11.1
Tonga	11.4	10.6	11.0	3.9	13.4	10.4
Kiribati	15.7	14.5	8.7	0.0 ^a	4.8	10.4
Federated States of Micronesia	18.7	10.1	8.2	7.3	7.2	9.1
Papua New Guinea	26.6	19.5	10.3	2.3	2.7	7.4
Solomon Islands	17.4	19.2	10.0	2.6	3.8	6.9
Marshall Islands	26.8	16.1	12.5	1.8	5.2	6.5

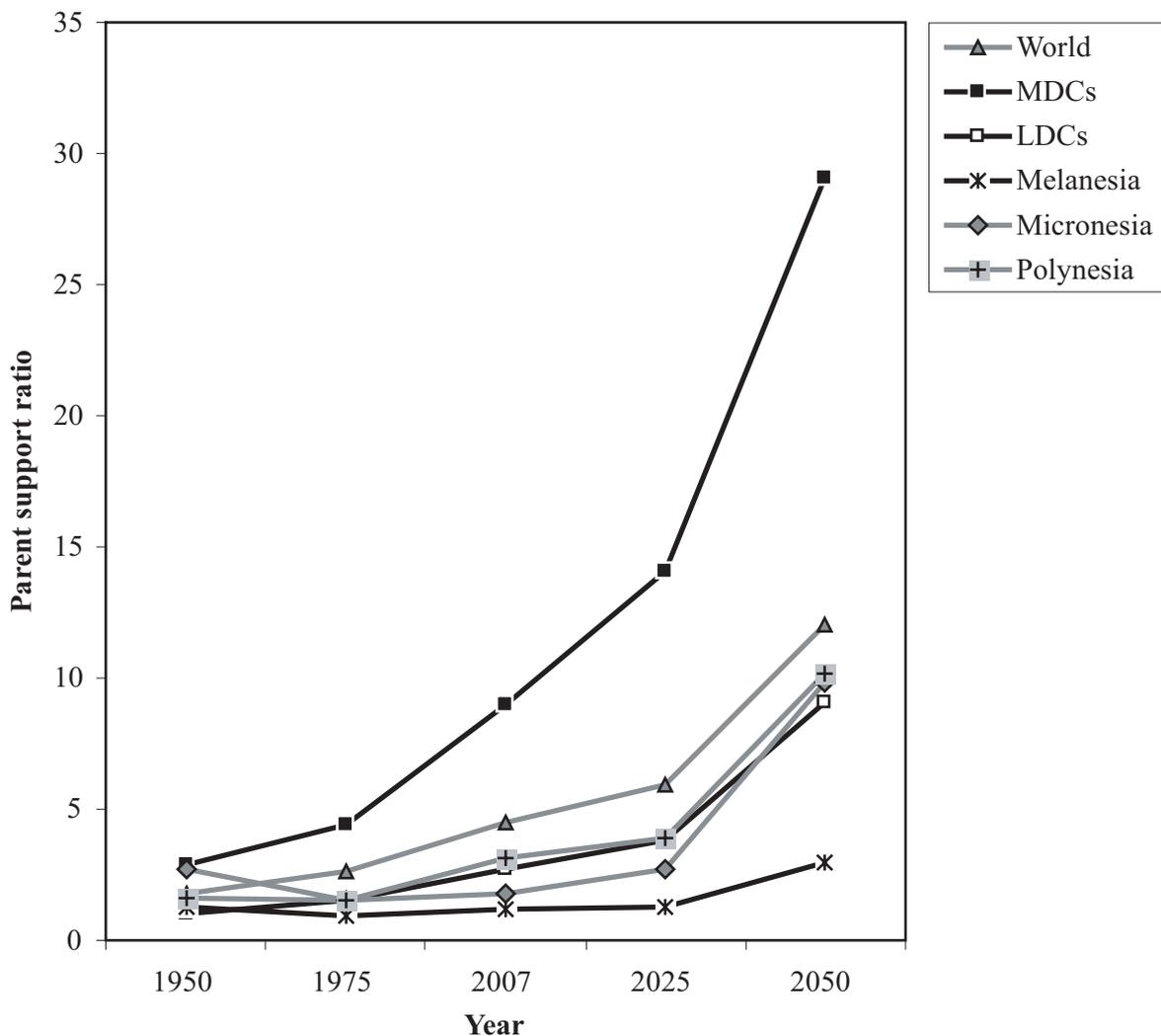
* Countries shown in italics in this table are dependent territories of France or the United States of America.

Source: UNFPA Population projections, 2008.

Note: ^a The 2000 census did not show any persons 80 or over.

As figure 10 shows, the parent support ratio has been increasing at a very rapid rate in the more developed regions and this rate of increase can be expected to increase after 2025. This is also the case in the less developed regions and in the Pacific islands but at a lower absolute level. In 2050, the “burden” of caring for the oldest old in the more developed regions will be three times as great as it will be in the less developed regions. In the Pacific, the parent support ratio can

Figure 10. Parent support ratio, 1950-2050



Source: United Nations, 2007.

be expected to more than double between 2025 and 2050, however, it varies by country.

As shown in table 6, the parent support ratio is projected to rise significantly over the next four decades. The extreme example is Northern Mariana Islands where, in 2050, there will be 38 persons aged 80 and over for every 100 persons aged 45-59. Aside from this country, Palau, Nauru and Niue will have parent support ratios over 20 by the year 2050. Two small Polynesian countries (Niue and Tokelau) will have a parent support ratio over 20 by 2025. This is no doubt a function of high rates of emigration, which have been projected to continue and that result in the children of the elderly living abroad.

Characteristic features of an ageing population

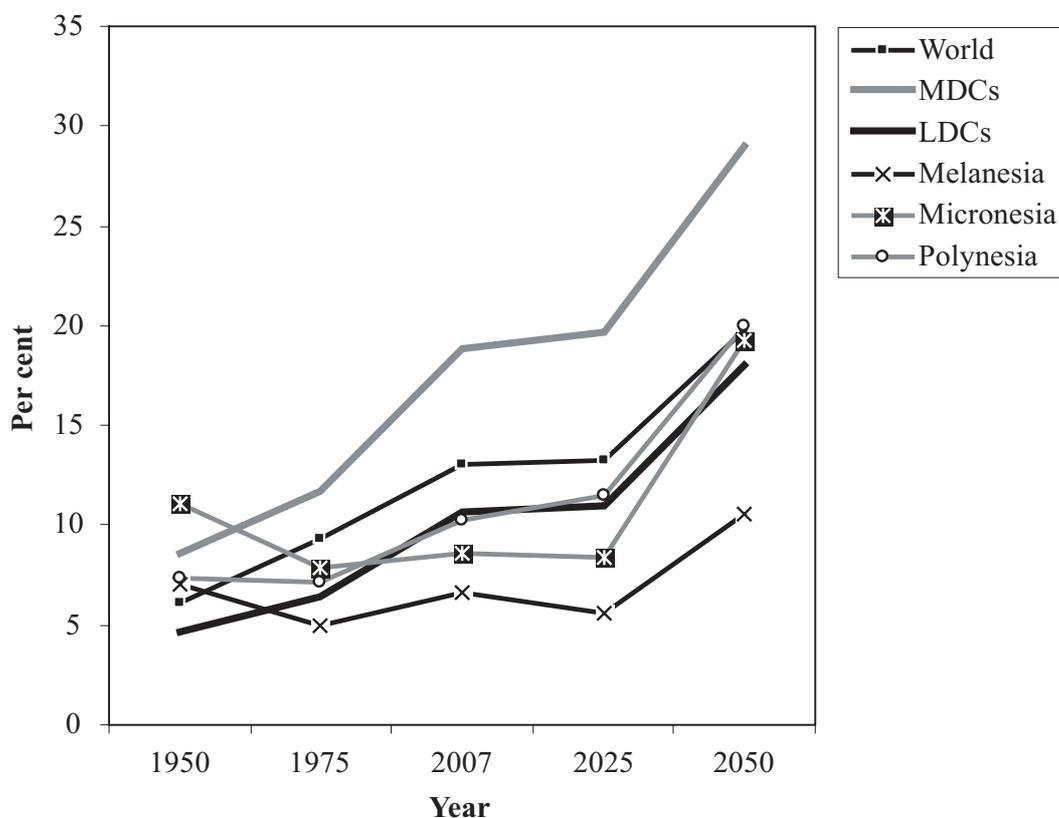
An ageing population exhibits a number of additional features that may not initially appear obvious. First, ageing continues throughout the age range. In other words, the old get older, like everyone else. Furthermore, ageing varies by sex and residence. Given that life expectancy is normally higher for women, a higher proportion of women survive to older age than men. The higher survivorship of women continues throughout the age range to the very oldest. Consequently, a higher proportion of the elderly are women. Finally, ageing occurs at different rates in rural and urban areas. Although fertility usually declines in urban areas before rural areas, rural-urban migration can have a similar effect because out-migration is usually selective of young people of labour force age. The implications of this are twofold: (a) the reduced proportion of working age population in rural areas accelerates ageing of the population in these areas; (b) older persons in rural areas may have less direct support than their counterparts in urban areas. The latter is indicated by changes in household composition over time in urban and rural areas.

Ageing of the older population

With increased longevity, a higher proportion of the older population (60 and over) will survive to even older ages; thus the older population will also age. This process is evident in figure 11, which shows the increasing proportion of “oldest old” (80 and over) in the older population. This process is clearly more advanced in the more developed regions, where almost 30 per cent of the older population will be 80 years of age and over by 2050, but the same trend is apparent in the less developed regions, including the Pacific island subregion. By 2050, 20 per cent of the elderly in Micronesia and Polynesia will be 80 years and over. In Melanesia, the proportion will be much lower, but also increasing.

The cause of ageing within the older population is increasing survivorship. The first half of the twenty-first century will experience steadily increasing survivorship to age 80 and beyond. This is evident from the projected survivorship rates shown in table 7. By 2005-2010, half the population of the more developed regions could be expected to survive to age 80 and this proportion is projected to increase to almost two thirds by 2045-2050. Similar trends are expected in less developed regions and in the Pacific islands. In Micronesia and Polynesia, over 55 per cent of the population will survive to age 80 by 2045-2050. In Melanesia, the proportion will be much lower but the trend will be similar.

Figure 11. Proportion of the population 80 years of age and over in the population aged 60 and over



Source: United Nations, 2007.

Table 7. Trends in longevity of older population

Region	Percentage of population surviving to 80 years of age		
	2005-2010	2025-2030	2045-2050
World	36.5	44.7	51.7
More developed regions	49.9	58.2	65.1
Less developed regions	32.3	41.4	49.2
Pacific islands			
Melanesia	16.7	25.7	35.2
Micronesia	39.4	48.0	56.2
Polynesia	37.9	47.1	55.3

Source: United Nations, 2007.

Furthermore, the average number of years that a person can expect to live past age 80 is also increasing (table 8). In the more developed regions this figure has already reached 8.2 years and is expected to increase to 10.4 years by 2045-2050. In Polynesia, life expectancy for an 80 year old is projected to reach 8.7 years by 2045-2050. The implications of those changes for health care are obviously quite profound for remote island countries – especially rural areas and outer islands.

Table 8. Life expectancy at 80 years

Region	Average number of years lived after 80 years		
	2005-2010	2025-2030	2045-2050
World	7.2	8.2	8.8
More developed regions	8.2	9.6	10.4
Less developed regions	6.4	7.4	8.2
Pacific islands			
Melanesia	5.2	5.8	6.3
Micronesia	5.8	6.4	7.1
Polynesia	7.1	7.9	8.7

Source: United Nations, 2007.

Feminization of ageing

Because women have lower death rates than men, a higher proportion of women than men survive into older ages. As a consequence, women frequently comprise the majority of older people. This is clearly the case in the more developed countries where, in 1975, 60 per cent of the older population was female. While a slight downward trend in this proportion is expected over the next few decades, by 2050, women will comprise the majority of older people in all regions (table 9).

Table 9. Percentage of females in the older population (60 years and over)

Region	1950	1975	2007	2025	2050
World	55.5	56.1	54.9	54.2	54.1
More developed regions	57.5	60.0	57.9	56.5	56.1
Less developed regions	53.8	52.9	53.3	53.3	53.5
Pacific islands					
Melanesia	45.4	51.8	49.3	53.2	51.5
Micronesia	51.9	48.8	52.7	51.4	52.7
Polynesia	48.0	50.8	51.6	52.9	52.2

Source: United Nations, 2007; UNFPA Population projections, 2008.

In the Pacific, the proportion of women in the older population will be somewhat lower than in other regions, but women will still be the majority. In 2000, several Pacific countries had high sex ratios among the old (table 10). The reasons for this vary between countries. In Western Melanesia (Vanuatu, Solomon Islands and Papua New Guinea), where the status of women is low, male life expectancy in older ages has been higher than female in some years. This is difficult to prove because all life table models assume the opposite and it is

Table 10. Indicators of feminization of the old in Pacific island countries, 2000-2050*

Country/area	Sex ratio of population aged 60 years and over			Proportion of the 60 and over population that is female		
	2000	2025	2050	2000	2025	2050
Tokelau	81.3	68.8	75.2	55.2	59.3	57.1
Kiribati	70.5	73.5	79.1	58.6	57.6	55.8
Niue	88.4	78.6	81.3	53.1	56.0	55.0
Northern Mariana <i>Islands</i>	113.0	143.4	82.4	46.9	41.1	54.8
<i>American Samoa</i>	92.9	83.0	85.3	51.8	54.7	54.0
Cook Islands	104.9	90.4	85.8	48.8	52.5	53.8
<i>Wallis and Futuna</i>	84.2	83.7	86.9	54.3	54.4	53.5
Fiji	90.9	81.6	87.3	52.4	55.1	53.4
Marshall Islands	93.8	84.7	88.0	51.6	54.2	53.2
Nauru	112.3	78.7	88.1	47.1	56.0	53.2
<i>French Polynesia</i>	99.1	93.6	88.6	50.2	51.7	53.0
Vanuatu	121.6	91.3	89.1	45.1	52.3	52.9
<i>New Caledonia</i>	91.8	88.8	89.5	52.2	53.0	52.8
Tonga	93.8	77.9	90.1	51.6	56.2	52.6
Palau	80.7	119.6	94.5	55.3	45.5	51.4
Tuvalu	76.2	73.1	92.2	56.7	57.8	52.0
Papua New Guinea	124.8	87.6	92.0	44.5	53.3	52.1
Solomon Islands	119.8	98.1	93.6	45.5	50.5	51.6
Samoa	90.9	92.8	95.6	52.4	51.9	51.2
<i>Guam</i>	93.0	90.8	96.5	51.8	52.4	50.9
Federated States of Micronesia	86.4	89.4	99.8	53.6	52.8	50.0

* Countries shown in italics in this table are dependent territories of France or the United States of America.

Source: UNFPA Population projections, 2008.

essential to use statistical models to produce life tables for those countries given their poor mortality statistics. Nevertheless, projections forward to 2050 indicate that the sex ratio of the older population will fall below 100 by that time and, with only one exception (Federated States of Micronesia), women will form the majority of the older population.

The feminization of ageing is likely to be more pronounced in the small Polynesian and Micronesian countries/areas of Tokelau, Niue, Cook Islands, American Samoa, Kiribati and the Northern Mariana Islands.

The proportion of women in the oldest old population (80 years and older) will eventually reach the levels found in other regions of the world, although not so high as in today's more developed countries (table 11). Currently, women in the more developed countries make up 68 per cent of the oldest old population, compared with 60 per cent in the less developed countries. In the Pacific, this proportion will be more than 62 per cent by 2050.

Table 11. Percentage of females in the oldest old population (80 years and over)

Region	1950	1975	2007	2025	2050
World	62.0	63.3	64.2	63.4	62.2
More developed regions	63.5	68.1	68.1	66.1	64.2
Less developed regions	59.5	56.4	60.1	61.3	61.3
Pacific islands					
Melanesia	42.0	55.6	50.7	59.9	63.6
Micronesia	55.6	60.0	56.8	62.8	62.6
Polynesia	50.0	57.1	63.2	62.2	62.2

Source: United Nations, 2007; UNFPA Population projections, 2008.

The high proportion of women among the oldest old age group has serious implications for their welfare. Most of the oldest old women are widowed and therefore lack the support of a spouse. This is explained by the higher death rates among men and the fact that husbands are usually older than their wives. Thus, there are more widows than widowers among the old. Furthermore, a higher proportion of widowers than widows re-marry. This is facilitated by the fact that there is an excess of females in the older population. In effect, therefore, the proportion of women among the oldest old will increase, with a high proportion of those women lacking the support of a spouse.

Spatial dimension: rural-urban differences

Given that the primary determinants of ageing are decreasing fertility and increasing longevity (processes that normally occur first and to a greater extent in urban areas than in rural ones), it would be logical to expect that ageing is more evident in urban than in rural areas. In many countries, however, the opposite is the case. In South-East Asia, for example, the percentage of older persons in the population is generally higher in rural areas than in urban ones (UNFPA Country Support Team, 2006). This pattern arises from rural-urban migration which disproportionately selects younger working-age persons. By contrast, urban-rural migration streams contain a high proportion of retirees returning to their villages of origin. The net result of these two processes is to hasten the ageing of the rural population.

Data are unavailable at the regional level to confirm this pattern in the Pacific, but recent census data for Fiji (table 12) show that, among the two main ethnic groups, the median age is slightly higher in rural than in urban areas. In the population as a whole, the pattern is reversed due to the effects of minority populations, which are concentrated in urban areas.

Table 12. Median age by ethnicity and residence, Fiji, 2007

Residence	Total	Fijian	Indian
Rural	24.9	23.1	28.0
Urban	25.2	22.9	27.8
Total	25.1	23.0	27.9

Source: Fiji Bureau of Statistics, unpublished tables.

Implications of population ageing in the Pacific islands

The challenges facing families, communities and societies as a population ages are universal but the social, economic, political and cultural context of each country determines the manner in which these challenges are addressed and the extent to which policies and programmes can be implemented. In the Pacific islands, geographical factors place a significant constraint on all aspects of social and economic development and this clearly includes the design and implementation of policies and programmes to address population ageing. This section discusses the general implications of an ageing population and places the main issues in the context of Pacific island conditions.

Health services

Increasing life expectancy presents an apparent paradox in that improved health conditions and lower mortality contributes to greater longevity; but those who live long lives will tend to experience higher rates of *morbidity* as they become older and will spend more time being sick or disabled. As the proportion of older persons in the population rises, health care becomes not only costly but also more labour- and technology-intensive. In the Pacific, the specialized technology and expertise required to address the needs of the old is often unavailable, even in the most developed island countries. Also, in the Pacific, increasing the budgetary allocation for health services in the face of so many other needs may involve difficult policy choices.

Most Pacific countries have established referral programmes whereby patients are sent abroad for treatment (to Australia, Hawaii or New Zealand) that is unavailable at home. Given the high costs associated with referral to overseas facilities, access is highly restricted and “rationed”. Elderly patients are unlikely to receive high priority through those schemes, which are generally focused on children and working-age persons. Another arrangement is for specialized medical staff to be brought to the islands on a periodic or rotational basis. Such arrangements are frequently voluntary on the part of the overseas medical staff or otherwise financed by international non-governmental organizations, private health providers or aid agencies (such as NZAID). Such arrangements may be effective on a small scale and where the necessary ancillary facilities (operating theatres, etc.) are available and maintained. But it is precisely the establishment and maintenance of medical facilities that presents a major challenge to health budgets in the Pacific. Only the largest urban centres are likely to have the required facilities and in many cases these are in private hospitals catering for the small minority of persons who can afford private treatment or have some form of health insurance.

As in many aspects of health, a preventive approach is likely to be more cost-effective than a curative one. Thus, a major priority in the Madrid International Plan of Action on Ageing (MIPAA) (United Nations, 2002) is “advancing health and well-being into old age”. Addressing this priority requires a range of policies and actions, including: (a) promoting health and well-being throughout life; (b) ensuring universal and equal access to health-care services; (c) addressing HIV/AIDS among older people; (d) training health-care providers on the needs of the older population; (e) addressing the mental health needs of the elderly; (f) maintaining functional capacity throughout the life course.

Many of the required policy measures under these headings can be taken by Pacific island countries experiencing ageing without incurring very large expenditures. Such measures as the promotion of healthy lifestyles, including improved nutrition, can and should be tailored to the local culture and the available foods. Ensuring equal access to health-care for the elderly involves the removal of social and economic inequalities based on age. These inequalities can be addressed following an assessment undertaken with the participation of old people themselves. In the Pacific, geographical factors are a primary cause of unequal access to health and social services. Outer islands and remote communities are the most difficult to service because of the high cost and unreliability of transport and communications.

Long-term care

In the Pacific, the care of old people in the family home is a strongly held value and this remains the typical arrangement. As life expectancy rises and degenerative rather than infectious disease becomes the main cause of death, home care places an increasing burden on family caregivers. Disability arising from degenerative disease may require constant (24 hour) attention and assistance by persons with appropriate training in geriatric medicine. Death from cancer, for example, may be preceded by a long period during which intensive care is required. Such assistance is not normally available in the average home in the Pacific.

As ageing proceeds in the Pacific, the development of more formal types of long-term, institutional care to support or supplement home care will become essential. The need will be greatest where ageing is most advanced and where the caregiving population has been depleted by migration. This applies most obviously in the Polynesian countries and Fiji. In some countries—Cook Islands, Niue and Tokelau—the population holds New Zealand citizenship and can potentially avail themselves of long-term care in that country. Other Pacific island countries—most obviously Fiji, Samoa and Tonga—have substantial migrant populations in Australia, New Zealand and the United States. These migrant communities are potentially able to finance long-term care for their elderly, either in their home countries or in their adopted homes. The issue of long-term care in the Pacific therefore intersects with issues of migration, multiple citizenship and also pension rights and transferability.

More research is needed on the implications of ageing for long-term care in the Pacific islands. First, more analysis of census and survey data on disability patterns by age is required. Second, more information on the living arrangements

of the older population is needed, including the living arrangements of older persons who are also disabled. Rural/urban differences would be an important cross-cutting dimension of this analysis. Studies of present arrangements for institutional care in the Pacific are also needed. Options for strengthening institutional care are of high priority while finding the right balance between informal (family) care and formal (facility-based) also needs to be explored in the context of the cultural values and preferences of Pacific islanders.

Family and community support

Institutional care may be more comfortable for those suffering from a disability, but placing elderly in an institution may be resisted by families because it suggests that the family is unwilling or unable to meet their cultural obligations. In the Pacific, the normal expectation is that children support their parents in exchange for the support that parents provided to their children. For the oldest old, however, this is a difficult expectation to satisfy, and the oldest old are the fastest growing age group in many countries. Furthermore, a range of processes, including urbanization, formalization of work, migration and nuclearization of the family (in short, “modernization”) are undermining the willingness and capacity of younger families to meet the cultural expectation of their parents and grandparents.

Given the “feminization” of ageing, older women are more likely to suffer because of these processes and also more likely to be living alone. By contrast, grandmothers also perform child-care tasks and may prefer to live in a co-residential family arrangement so long as their own health permits. In Asia, co-residence is declining and institutionalization increasing. It is unlikely that these trends are occurring in the Pacific but concrete data are currently lacking. In the long run, it is inevitable that institutionalization will increase, but the form of institutionalization may be different from that found in more developed countries.

It would be useful for Pacific countries in which ageing is occurring rapidly to assess the potential types of institutional arrangements that are most suitable for societies in which the extended family is still the strongest social unit even though it is coming under strain. In the industrially developed countries, retirement “villages” that combine individual residence with hospital and hospice services provide a sharp contrast to the single-family home in which most people live their lives. In the Pacific, however, some variant on “village” living is common and a village type living arrangement for the elderly is not such a radical departure from customary residence.

Informal caregiving, particularly to the oldest old, can be stressful and caregivers can easily become overburdened—especially when attempting to balance child care and employment obligations. Community care involving volunteers or extended family members can ease the pressure on the immediate family. Commonly, such arrangements do not involve compensation for the caregiver, but there are limits to generosity and compensation in some form may be called for.

It is important to acknowledge that informal care does not, and cannot, replace professional care. What is generally required is a continuum of care from a range of sources—family, community, hospitals or clinics and hospices. The appropriate mix of these forms depends in part on individual and cultural preferences, personal needs and availability.

The issue of institutional versus family care also intersects with the issue of housing options. Many elderly people may prefer “independent living” to living with family or other older people. But independent living also raises issues of transport and mobility, especially among those who may suffer a disability. In urban areas, the transport needs of the older population can partially be met by subsidized public transport and the modification of vehicles to meet the access requirements of the old and infirmed. In rural or outer island areas in the Pacific, the impediments to mobility may be greater, especially where sea travel is concerned.

Work, income and social protection

Social and economic participation encompasses a wide variety of activities, including work and employment, involvement in decision-making and expressive culture. With regard to work and employment, it is a widely accepted principle, expressed in the MIPAA, that older persons should have the opportunity to work for as long as they wish and are able to do so productively. In reality there are many obstacles to the full employment of older persons. In the Pacific, public sector employees may face compulsory retirement at the age of 50, 55 or 60.⁹ Private sector practice may follow the public sector on the grounds that older persons should yield their jobs to younger people who are more educated and qualified and wish to form their own families. This argument is certainly compelling in countries where the proportion of youth in the population remains high or is still rising and where formal employment opportunities are limited. But employment growth should in any case be at the heart of macroeconomic policies and rapid employment growth would avoid the “zero-sum” situation whereby the old have to yield to the young, resulting in the virtual “rationing” of jobs.

More flexible retirement policies might result in compromise arrangements whereby older workers past retirement age might combine part-time work with mentoring and training functions.

In the Pacific, as in most developing countries, the majority of the population which is now old have spent their working lives in the rural village economy or the urban informal sector. Consequently, the possibility of “retirement” in the sense of being in receipt of a pension does not necessarily exist.¹⁰ Personal savings are usually minimal or non-existent. In the village economy, the capacity to work depends mainly on the health and disability status of the elderly, assuming that they have the usual access to planting land and the typical array of capital goods.

The principle of “employment for all” is supported by the MIPAA, but achieving this objective is difficult, particularly in rural settings. Older women, for example, face many obstacles, including illiteracy or low levels of education, lack of job experience, skills or qualifications. The provision of micro-credit for the elderly is one strategy that could assist older men and women continue to earn an income beyond their own subsistence. Another related principle enunciated in the Madrid International Plan of Action on Ageing is “lifelong access to education and training”. Given rapid changes of technology, older people who wish to work and are capable of working may nevertheless require re-training. In the Pacific, the concept of adult education is little known and polytechnics are oriented almost entirely to the young. In rural areas and outer islands, opportunities to obtain occupational training or re-training are usually minimal. Government support for the retraining of older workers is virtually non-existent.

Other forms of social protection include contributory or non-contributory pension or superannuation schemes. The scope and effectiveness of these schemes in the Pacific is not well known. Some countries (Papua New Guinea and Fiji, for example) have national provident funds to which both public and private employees contribute. The Micronesian countries of Palau, Federated States of Micronesia and Marshall Islands have a social security scheme based on the American pattern, i.e., funded from contributions from wages and salaries. Non-contributory old-age pensions are paid in Samoa, Cook Islands and Niue, but the amounts involved are small both in relation to needs and the government budget. Attempts to increase the old age pension in Niue failed because the government budget could not sustain it. Pacific islanders who have worked for at least 20 years in New Zealand and have reached retirement age are able to receive their New Zealand superannuation in their home countries under certain conditions. The value of these payments is well in excess of what island Governments could afford.

In effect, superannuation sourced from abroad plays a similar role in the island economy as migrant remittances. These payments are usually indexed to inflation, but in the country of origin not the islands. In some countries, remittances from family members abroad function as an informal pension plan.

Research is needed on the full range of social protection schemes available in Pacific island countries and their effectiveness. It is also required on current and future impact of old-age security on government budgets. This is obviously more urgent in those countries that have already begun to experience population ageing; but all countries can benefit from a review of the potential budgetary impact of ageing given that the creation of investment funds to supplement or replace the direct contribution from annual budgets is a long-term strategy with a time frame of decades rather than years.

Conflict and emergency situations

The older population is particularly vulnerable during emergency situations arising from natural disasters, epidemics or civil war. The elderly suffer more in natural disasters (cyclones, tsunamis and earthquakes) due to their impaired mobility. During epidemics, the older population is likely to have higher infection rates and death rates than younger adults. In conflict situations, the needs of the elderly tend to be ignored or overlooked.

In countries experiencing a generalized HIV/AIDS epidemic, the older population may be forced to become caregivers to their grandchildren if the parental generation has died. If grandchildren are also infected, the strain on elderly grandparents may be serious, possibly leading to their impoverishment. This aspect of the HIV/AIDS epidemic has been little studied in the Pacific, although Papua New Guinea is the only country in which this is likely to be a serious issue at present.

In the Pacific, natural disasters, such as cyclones, tsunamis, droughts, floods and earthquakes, are common. Every country has a disaster preparedness plan but the extent to which the special needs of the elderly have been addressed is not known.

Positive aspects of ageing

In Pacific island cultures, older people are normally given a great deal of respect and even veneration. In those Pacific societies in which chiefly titles are inherited by primogeniture, chiefs may hold their titles to an old age and only

upon their death is the title transferred to the next right-holder. Even in those Pacific societies lacking inherited chiefly titles, older people—men in particular—are given respect as sources of traditional knowledge and skills and arbitrators of disputes or conflict.

In urban settings, however, this cultural respect is eroding. Traditional skills are less relevant and the functions of chiefs more obscure. The role of the elderly in economic development may not be obvious. The savings of the elderly provide a pool of investment capital either directly in bank savings or indirectly through pension funds or stocks and bonds. Older workers may be more productive than younger ones because of their experience, motivation and lower rates of absenteeism. But the public image of the elderly may focus more on the negative aspects, such as the costs of their health care.

The promotion of a positive image of older people is an important objective of the MIPAA. In the Pacific, where custom and tradition are still respected (even if this respect is eroding under globalization), this task is less difficult than it might be in a fully industrialized and monetized economy. Examples of how the traditional knowledge and skills of the old can contribute to recovery after natural disasters would not be difficult to find given the frequency of cyclones, floods, tsunamis and droughts.

Policy and implementation issues in the Pacific islands

Policy recommendations are broadly categorized into three groups: older persons and development; advancing health and well-being into old age; and ensuring enabling and supportive environments. With regard to older persons and development, at the highest level, the main policy recommendation is that the issue of ageing should be incorporated within the social and economic policies, strategies and actions of countries, including poverty reductions strategies and plans. Older persons should be full participants in development processes and share in its benefits. Public policy should focus on the elimination of the barriers that prevent older persons from participating in social, cultural and economic activities. Given that ageing is occurring at a rapid rate in many Pacific countries, it follows that the contribution of the older population to development will increase in the future and impediments to their participation should be removed to the maximum extent possible.

Health issues are at the forefront of concerns about ageing. There is a wide range of possible actions that Governments can take to prevent ill health in older

ages, but individual responsibility also plays a part. Among others, promotion of healthy lifestyles and access to universal health-care services are major policy options.

With regard to ensuring enabling and supportive environments, Governments at all levels have a particular role to play in addressing issues of the “living environment” in which the elderly find themselves. First and foremost is the issue of appropriate and affordable housing. Also, policies should be put in place to eliminate all forms of neglect and abuse of older persons and violence committed against them and to create support services to address elder abuse.

Conclusions and recommendations

Conclusions

As in other world regions, population ageing is occurring in the Pacific islands and will accelerate in the coming decades. The pace of ageing varies widely between subregions and individual countries. Ageing is occurring most rapidly and is most advanced in the small countries of Polynesia and Micronesia. The countries that are projected to have the oldest populations by 2050 are those that are linked to more developed countries on the Pacific rim, either as dependent territories or through close migration and socio-economic relationships. The pace of ageing is much slower in Melanesia with the exception of Fiji and New Caledonia. While the majority of elderly in the Pacific will be women, the feminization of ageing is unlikely to reach the levels of the more developed regions. Among the oldest old, however, over 60 per cent are likely to be women by 2050.

Ageing is likely to be more pronounced in rural than in urban areas, but insufficient analysis has been done at the country level to confirm this. Likewise, the poverty status of elderly in the Pacific has not been studied in depth but it is likely that the older population living in rural and outer island areas is more likely to suffer hardship than their urban counterparts—in part because of their greater vulnerability to natural disasters. Formal social security schemes are not well developed in the Pacific outside those countries that remain territories of more developed countries. But rural village workers and urban informal sector workers are largely uncovered by contributory schemes although they may have access to government assistance if destitute.

The extended family remains largely intact across the Pacific islands and will be the main provider of care for the elderly for the foreseeable future. But the

social solidarity of the family is weakening under the influence of urbanization, internal and external migration and changing attitudes and values. Family support will need to be supplemented by stronger government programmes in the future.

The way forward

The primary responsibility for developing national action plans and strategies to address population ageing lies with national governments, but international agencies, non-governmental and civil society organizations can all play a part in supporting government efforts. Within the United Nations system, responsibility for supporting the implementation of the Madrid International Plan of Action on Ageing 2002 has been given to the regional commissions. In the Pacific, this role is played by the Economic and Social Commission for Asia and the Pacific (ESCAP). The United Nations Population Fund (UNFPA) also has a major role to play by virtue of the Plan of Action of the International Conference on Population and Development (1994), which includes actions to address population ageing. UNFPA also has an important role to play in producing in-depth situational analyses through the analysis and dissemination of census and survey data on the elderly. ESCAP and UNFPA should work together to improve the knowledge base on ageing in the Pacific. The World Health Organization (WHO) also has an important role play with regard to health-care issue while the International Labour Organization (ILO) has expertise in the area of social protection.

Given the relative inattention given to ageing issues in the Pacific islands, it is important to promote awareness of the Madrid International Plan of Action on Ageing among island Governments and relevant non-governmental organizations.

Intergovernmental cooperation between Pacific island Governments should be fostered, particularly through knowledge-sharing. Given the variation across the region in the pace and timing of ageing, those countries that started the process earlier can provide valuable lessons that can be shared with those countries that will age much later. Knowledge-sharing should also extend beyond the Pacific island region to the wider Asian and Pacific region. Many Asian countries retain strong extended family structures as found in the Pacific and face similar challenges in balancing home and institutional care.

The other countries that make up the greater Oceania area, namely Australia and New Zealand, are also important because their populations have been ageing for some time and both countries have put in place national strategies to address ageing issues that can provide lessons for Pacific countries.

Endnotes

1. The French territories are French Polynesia, New Caledonia and Wallis and Futuna. The United States territories are American Samoa, the Northern Mariana Islands and Guam. Pitcairn is a British territory but is not included in this analysis because it has a population of less than 100.
2. Hereinafter cited as “UNFPA Population Projects, 2008”. The assumptions employed in these projections were derived from projections previously carried out by the Secretariat of the Pacific Community for the period 2008-2030 but adjusted for the period 2000-2050.
3. In the UNDESA analysis, however, only the total populations of the countries with fewer than 100,000 people have been added to the subregional totals (for Melanesia, Micronesia and Polynesia). In the case of the UNFPA projections, age-sex disaggregated data have been used as the base populations for the subregional projections. Further details are provided in annex II.
4. Melanesia includes Fiji, New Caledonia, Papua New Guinea, Solomon Islands and Vanuatu. Micronesia consists of Guam, Kiribati, the Federated States of Micronesia, Marshall Islands, Palau and the Northern Mariana Islands. The Polynesian countries and areas are: American Samoa, Cook Islands, French Polynesia, Niue, Samoa, Tokelau, Tonga, Tuvalu, Wallis and Futuna.
5. Excluding Pitcairn Island, which has fewer than 100 people.
6. For statistical convenience, regions around the world are grouped in two general categories—more developed and less developed—on the basis of demographic and socio-economic characteristics, as per the grouping proposed in *World Population Ageing 2007* (United Nations, 2007). The less developed regions include all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean, and Oceania (excluding Australia and New Zealand). The more developed regions include all other regions plus the three countries excluded from the less developed regions (see annex II from United Nations 2007 for further detail).
8. In January 2007, the Government of Fiji reduced the retirement age for civil servants to 55 from 60 years. This decision was contested in the courts, but the right of Government to set the retirement age for public servants was upheld.
9. In Samoa, Cook Islands and Niue, however, the Government provides a small pension for the population aged 65 and over.
10. The cooperation of SPC is gratefully acknowledged. The use of the projection input provided by SPC and the subsequent modification of these inputs is the responsibility of the author alone, not SPC.

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