

Morbidity and disability in elderly Zimbabweans

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Abstract

Background: the population aged over 60 years in Zimbabwe is expanding. Despite the likely increased demand on medical services that this will bring, little is known about the health needs of this elderly population.

Objective: to record the prevalence of disability (impairment of activities of daily living), subjective morbidity (symptoms), the social circumstances and the utilization of health services in a group of elderly Zimbabweans.

Design: cross-sectional community survey

Setting: a remote rural area in North Eastern Zimbabwe and two urban townships located approximately 80 km from Harare.

Subjects: 278 subjects (154 women, 174 rural), aged > 60 years (range 60–92) living at home.

Method: subjects were selected by random cluster sampling. They were assessed in a structured interview and underwent physical examination including visual acuity, inspection for cataracts and assessment of mobility.

Results: less than 4% experienced difficulty with self-maintenance activities of daily living, but 30% had difficulty with instrumental activities. The former were all visually impaired and both visual and mobility problems contributed to the latter. Elderly people experienced many symptoms but had inadequate access to health services and used medication infrequently. Subjects were mainly self-sufficient for financial income and 60% still worked. They had declining resources with age and received little help from the social welfare department. Their health and functional abilities deteriorated with age but it was older subjects who had most difficulty getting to the clinic. Simple measures such as cataract surgery and analgesics were available only to the minority or not at all.

Conclusions: this study highlights problem areas where simple, low-cost measures could make a difference to the morbidity and disability of elderly Zimbabweans.

Keywords: Africa, aged, activities of daily living, cataracts, morbidity, Zimbabwe

Introduction

The population of Zimbabwe is 10.4 million, 5% of whom are aged over 60 years. In 1969 the population was only 5.1 million, with 3% over 60. During the same period the average life expectancy has risen from 49 to 60 years for men and from 53 to 64 years for women [1, 2]. The population aged over 60 will quadruple between 1982 and 2032 and the proportion of older people will continue to rise [3]. This absolute and relative increase in the elderly population reflects a global trend which is particularly marked in the developing world [4]. It is occurring at the same time as traditional supportive

family networks are under threat. The situation may be further compounded by the AIDS epidemic, which is causing a selective increase in mortality in young adults.

In order to facilitate effective policy-making and appropriate targeting of aid it is important that the current health status of the oldest age groups is known. Although some reports have made this recommendation [4, 5], there have been few studies in Africa [6–10]. We have documented the prevalence of disability, the social circumstances and the utilization of health services in elderly Zimbabweans. Since support networks, patterns of disease and access to health care facilities may differ between

rural and urban communities, the survey was carried out in a remote rural area and two urban townships.

Methods

Location

Rural

The rural locality was Uzumba Maramba Pfungwe, a district in North Eastern Zimbabwe covering an area of 2646 km². Its most distant point is 245 km and its nearest point 120 km from Harare and most of it is only accessible on untarred roads. It is divided into 15 wards, each with six village development units (VDUs). Each VDU comprises 60–100 households. The population in 1992 was 86 308, with 5793 (6.7%) over 60 [2]. The male to female ratio for the over-sixties was 1.0:1.1.

Urban

Two high-density residential areas were chosen, Chipadza in Bindura and Dombotombo in Marondera. Both towns are approximately 85 km from Harare. Bindura has a total population of 21 167, of whom 508 (2.4%) are aged over 60. Marondera has a total population of 39 384, with 1194 (3.0%) over 60 [2]. The male to female ratio for the over-sixties of both townships was 1.0:0.8.

Sampling

To ensure that subjects were distributed throughout Uzumba Maramba Pfungwe, a random cluster sampling design was used [11]. For each ward one VDU was selected at random. Within that VDU alternate households were visited and members over 60 years asked to participate in the survey. Wherever possible males and females were selected alternately to obtain an equal sex ratio, although when there was only one subject aged over 60 in the next household they were asked to participate regardless of sex. The net result of this was a slight excess of females in the study population. In households where there was more than one eligible member of the same sex only one was counted (alternately the younger and the older of the pair).

The urban townships are organized on a grid pattern. Subjects were recruited from alternate houses within alternate streets, using the same criteria as rural subjects. Many subjects did not accurately know their own age. For these subjects age was estimated based on physical appearance, the age of oldest children, grandchildren or great-grandchildren and memory of major historical events, such as the influenza epidemic of 1918, the locust plagues of the 1920s and the Second World War (when many Zimbabweans were conscripted).

Interview and physical assessment

Interviews and physical assessments were carried out in local languages by specially trained research nurses familiar with medical diagnosis, using a structured questionnaire. Consistency in interview technique was ensured by one of the study doctors (T.A.) who regularly visited the study area and observed the interviews. No selected subject refused to participate in the survey, although one subject failed to complete the questionnaire and nine did not complete the physical examination. All subjects were interviewed in private. If a subject was unable to respond to any part of the interview, a proxy response was requested from a relative within the household.

In addition to detailed demographic data, the questionnaire contained sections on experience of symptoms within the previous 12 months and current medication (A copy of the questionnaire is available from the authors on request). The ability to perform activities of daily living (ADL) was assessed using a 14 item questionnaire, including six items of physical self-maintenance [12, 13] and eight more complex (instrumental) activities appropriate for the local setting and incorporating items from the WHO ADL list for community-based rehabilitation [14]. The items of planting, weeding and harvesting refer to work in the field necessary for small-scale maize or vegetable production. Physical assessment involved inspection of the eyes with a torch to look for cataracts and visual acuity using a Snellen chart. For items such as mobility the nurses' own assessments were recorded and compared with the patients' self-reported abilities. Items such as current medication and distance to amenities were corroborated by physical evidence.

This study received ethical approval from the Zimbabwe Medical Research Council.

Results

The sex and age composition of the study population is summarized in Table 1. Most subjects had lived in the same area for many years. In the rural area seven subjects had lived there for less than 10 years and only one for less than 5 years. In the urban area four subjects had moved to the township within the last 10 years and only one within the last 5 years.

ADL measurement

Most subjects were able to perform basic self-care, but some were unable to perform more demanding activities (Table 2). Inability to perform simple tasks of physical self-maintenance (bath, dress, toilet, feed, groom) was confined to 10 individuals, all of whom were visually impaired (eight had either perception of light only or no perception of light); one of these had also had a stroke. Twenty subjects (7%) stated they

Table 1. Age and sex distribution of respondents according to area (sum of percentages may not equal 100% due to rounding)

Group	No. of respondents	Sex (M:F)	Age distribution			
			60-64	65-69	70-74	75+
Rural	174	74:100	27 (16%)	35 (20%)	43 (25%)	69 (40%)
Urban	104	50:54	28 (27%)	36 (35%)	22 (21%)	18 (17%)
Total	278	124:154	55 (20%)	71 (26%)	65 (23%)	87 (31%)

For most subjects age was estimated. Urban residents were significantly younger than rural residents, mean (range) 68.9 (60-92) *vs* 72.5 (60-92) years, $P < 0.001$. There was no difference in age between the sexes.

could only walk with assistance and three (1%) that they could not walk at all, but of those who were independently mobile a further 163 (58%) stated they had difficulty walking. When asked why they had difficulty walking the commonest reasons given were joint problems ($n = 99$) and pain ($n = 85$). Other problems included burning feet ($n = 56$), weakness ($n = 20$), poor vision ($n = 14$), breathlessness ($n = 9$) and dizziness ($n = 7$). (Multiple reasons were given by 101 subjects.) There was a significant decline in the ability to perform basic ADL components with age, and no overall difference in this between rural and urban subjects.

For the instrumental activities (Table 2) some respondents did not answer because the activity was not part of their household duties (e.g. some men did not collect water). Complete data for all eight questions are only available for 214 of the 278 subjects, of whom 72% were able to perform all activities without assistance. Mobility was important for carrying out these activities; all 23 subjects who required assistance with walking or were unable to walk and 29% of the 163 who did not require personal assistance but still had difficulty with walking had some impairment

of instrumental ADL components. For four items rural residents had more difficulty than urban residents, these were cooking, planting, weeding and harvesting (Table 2). Logistic regression analysis revealed that increasing age, rural residence, female sex, impaired visual acuity and difficulty with walking were all significantly, independently related to impairment in instrumental ADL items.

Access to services

Table 3 summarizes the distance to basic services (shop, clinic or bus stop) and whether older people were able to reach these services. Although the distances were shorter in the urban areas, similar percentages experienced difficulty getting to these places as in the rural areas. Those who experienced difficulty were older than those who did not. In addition to clinic facilities, villages are supposed to have a village health worker to visit people in their homes. We therefore asked when they had last been visited by a health worker at home and learned that 39 (22%) in the rural area but only two in the urban area had been visited at home by a health worker within the

Table 2. Instrumental activities of daily living

	Make fire	Cook ^a	Housework	Collect water	Collect wood	Plant ^a	Weed ^a	Harvest ^a
Able (%)								
Rural	90	87	87	81	82	66	67	66
Urban	94	96	93	86	84	85	85	86
Require help (%)								
Rural	1	2	5	4	2	22	22	22
Urban	2	2	3	6	3	3	3	3
Unable (%)								
Rural	10	11	8	15	16	12	12	12
Urban	4	2	4	8	12	11	11	11
Total no. of respondents								
Rural	135	138	139	132	135	171	170	171
Urban	95	100	98	88	90	96	96	97

The total differs for different activities as not all subjects undertook all activities. Percentages given are for those who responded.

^aDiffered significantly between rural and urban subjects, $P < 0.001$ (plant, weed, harvest) and $P < 0.05$ (cook) by χ^2 test.

Table 3. Distance from basic amenities, ability of subjects to gain access to amenities and age of each group

	Shop	Clinic	Bus stop	Water supply
Distance, km (range)				
Rural	2.5 (0.2-10)	4.4 (0.6-12)	1.4 (0.01-8)	1.0 (0.01-3)
Urban ^a	1.4 (0.1-3.2)	2.3 (0.2-5.6)	0.8 (0.1-2.8)	<0.01
Access unaided				
Rural (%)	87	81	89	81
Urban (%)	89	89	89	86
Mean age of group (years)	70.3 ^b	70.1 ^b	70.4 ^b	70.8 ^b
Access with help				
Rural (%)	6	10	6	4
Urban (%)	7	7	7	6
Mean age of group (years)	79.1	77.0	77.1	73.2
No access at all				
Rural (%)	7	9	5	15
Urban (%)	4	4	4	8
Mean age of group (years)	77.7 ^b	78.1	79.5	78.8

n = 277 except for water supply (41 rural and 16 urban subjects did not collect water).

^aDistance to all amenities significantly shorter in urban area, *P* < 0.001 for each by Student's *t*-test.

^bSubjects without difficulty significantly younger than those with difficulty, *P* < 0.001 by Student's *t*-test.

last month. Only seven of these were among the 43 subjects who required assistance to reach their local clinic or could not get there at all. There was no difference in age between those who had been visited and those who had not.

Vision and hearing

One hundred and eighty-five (67%) stated that they had some problem with their eyes. One hundred and forty-two (51%) complained of painful eyes. Only 28 (10%) wore glasses. On examination 31 (11%) had a best visual acuity (with glasses if worn) of 6/60 or less and, of these, 12 could only count fingers and 10 could only perceive light and dark at best. A further 42 (15%) had an acuity of 6/60 or less in one eye. Of the 31 subjects who had bilateral acuities of 6/60 or less, 27 had cataracts. Overall, 133 (47.8%) subjects were found to have bilateral cataracts and a further 24 (8.6%) had a unilateral cataract. Fifteen subjects had had previous surgery for cataracts and two were on the waiting list for surgery.

Fifty-five subjects (20%) reported problems hearing. No subject had a hearing aid. Both declining visual acuity and self-reported deafness increased significantly with age.

Continence

Twenty-six subjects (9%) had experienced urinary incontinence and 19 subjects (7%) had experienced faecal incontinence within the preceding year; 3% of subjects had been or were incontinent of both urine

and faeces. Those who were incontinent of urine were significantly older than those who were not, but there was no age difference for faecal incontinence and no sex difference for either.

Morbidity

Subjects were asked about their experience of symptoms within the preceding 12 months. These questions revealed a considerable morbidity (Table 4). Although a number of these symptoms may be considered trivial or may not signify serious pathology, they still contribute to the subjective perception of ill health in this group. Some potentially more serious symptoms were elicited, for example 18 subjects reported cough with green sputum, six reported haemoptysis and five had symptoms of congestive cardiac failure. The only symptom which increased significantly with age was difficulty chewing. Only three subjects wore dentures.

One hundred and seven (39%) complained of insomnia. The commonest reasons given were pain (*n* = 60) and difficulty breathing (*n* = 20). Fourteen percent of subjects had problems with falling, but there was no increase in falls with age. Sores were reported by 13 subjects. The commonest sites were the leg, foot or both (*n* = 10). One subject had genital sores and one had a *Herpes zoster* eruption.

Thirty-six (21%) rural and 39 (38%) urban subjects were taking medication. The most common treatment was antihypertensive drugs (*n* = 35). There was a large discrepancy between the experience of symptoms and the use of medication. None of the subjects who were symptomatic of congestive cardiac failure was on

Table 4. Symptoms experienced within the preceding year

	No. of subjects		
	Rural (%)	Urban (%)	Total (%)
Pain	167 (96)	103 (99)	270 (97)
Joints	115 (66)	78 (75)	193 (69)
Head	117 (67)	83 (80) ^a	200 (72)
Back	106 (61)	57 (55)	163 (59)
Chest	79 (45)	49 (47)	128 (46)
Gastrointestinal	139 (80)	75 (72)	214 (77)
Diarrhoea	60 (35)	52 (50) ^a	112 (40)
Weight loss	83 (48)	26 (25) ^b	109 (39)
Chewing	68 (39)	32 (30)	100 (36)
Constipation	43 (25)	17 (16) ^b	60 (22)
Respiratory/cardiovascular	120 (69)	73 (70)	193 (69)
Cough	83 (47)	57 (55)	141 (51)
Breathlessness	39 (22)	29 (28)	68 (25)
Ankle swelling	40 (23)	14 (14) ^b	54 (19)
Wheeze	17 (10)	12 (12)	29 (10)
Genitourinary	108 (62)	44 (42)	152 (55)
Nocturia	53 (30)	32 (31)	85 (31)
Dysuria	51 (29)	13 (13) ^b	64 (23)
Dribbling	50 (28)	9 (9) ^b	59 (21)
Hesitancy	22 (12)	5 (5)	27 (10)
Haematuria	12 (7)	1 (1)	13 (5)

^aSignificantly more common in the urban area; ^bsignificantly more common in the rural area, $P < 0.05$ by χ^2 test.

medication for heart failure, only 12 of the 29 subjects reporting wheeze and breathlessness were on anti-asthma treatment and, despite the frequent occurrence of pain, only 28 subjects were taking analgesics. Two subjects with epilepsy were identified and neither were on anti-epileptic medication. There was no age or sex difference in the use of medication but those who lived in the rural areas were significantly less likely to be taking medication.

Choice of treatment

Subjects were asked where they would first seek help if they were taken ill. Most subjects ($n = 238$, 86%) stated that they would attend their local clinic or hospital, while four said they would see a private doctor. Eleven said they would attend church for healing and five that they would visit a n'anga (traditional healer). Others indicated a preference for self-medication, in the rural area with herbs ($n = 7$) and in the urban area self-prescribed, bought medication ($n = 9$). The difference between the urban and rural areas probably reflects the availability of these treatments in the different areas: only one rural subject expressed a preference for self-prescribed, bought medication.

Social circumstances

Although a detailed description of the social circum-

stances of elderly people is beyond the remit of this paper, the level of physical disability has to be regarded in the context of the life style of elderly people.

Twenty-seven subjects lived alone: 20 women and seven men. In the rural area 111 subjects (64%) had to collect their own water and, of these, 12 reported that it took them at least 1 h to walk to the water supply. A further 35 took between 30 min and 1 h to walk to the water supply. In the rural area 95 subjects used the bush as a toilet and 77 used Blair or pit latrines.

Most were largely dependent on their own endeavours for their financial income, and 72% of the rural and 40% of the urban elderly sample still considered themselves to be actively working. The figures were similar for both sexes. The most frequent occupation in the rural area was peasant farming; in the urban area it was self-employed vending. Those who were working were younger than those who were not (urban: 67 ± 4.4 vs 71 ± 7.3 years, rural: 72 ± 6.6 vs 75 ± 8.2 years).

Annual income declined with age. Only one subject in the rural area and nine in the urban area were receiving financial help from the social welfare department. In most cases it was given to help with school fees for the subject's children. Interestingly, those who received social welfare help were slightly younger than those who did not (69 ± 10 vs 71 ± 7 years, $P > 0.05$), which may reflect that it requires an awareness of availability and a good deal of persistence

to obtain a social welfare report. Two hundred and twenty-five (81%) received support from their children or other family, although the sums of cash given were generally small, less in the rural area, (Z\$ 101 *vs* Z\$ 552) and declined significantly with age.

Seventy-eight (45%) rural and 29 (28%) urban elderly looked after grandchildren.

Discussion

This study provides a comprehensive picture of the occurrence and main causes of disability, the experience of symptoms and the utilization of health resources in elderly Zimbabweans living in two provinces in Zimbabwe. The study was largely based on self-reporting. Although this has shortcomings in terms of the validation of patient responses it was the only practical way of conducting such an extensive survey.

In the assessment of ADL we found very few older people who were unable to perform activities relating to physical self-maintenance. This is not surprising since these items are most appropriate for use in a rehabilitation setting [15] and are unlikely to be abnormal among people living in the community. Of greater relevance are the instrumental activities which are more useful measures of independence. We found that nearly one-third of subjects had some difficulty with these. This level of disability is similar to that which has been reported in reviews of instrumental ADL from Thailand [16] and Botswana [14] and is greater than would be found in industrialized countries. Our study found that mobility and visual acuity were important determinants of ability to perform ADL. The observation that mobility and visual problems were largely untreated may contribute to the difference between our population and elderly people in developed countries.

It is not apparent why women should be over-represented in those experiencing difficulty with instrumental activities. A possible explanation is that most non-responders for this section of the questionnaire were men. They stated that they were unable to respond because certain activities were not their household duty, but may have been concealing that they were physically unable to perform those activities. Our assessment of ADL reveals a number of shortcomings with the activities chosen; ideally they should be independent of gender roles and applicable in both rural and urban settings. Interestingly, collecting water and wood were applicable in the urban areas since, although water is piped, it still has to be collected from a tap outside the home and even in urban households most people still cook on wood fires. Attempts have recently been made to develop and validate an ADL score for use in Asia [15]. A similar scale needs to be developed for use in Africa so that comparisons can be made longitudinally and between different countries.

Blindness is predominantly a problem of developing countries and, worldwide, the number of cases of

blindness is increasing [17, 18]. Recent studies in Tanzania [9] and Botswana [19] suggest that the number of over-sixties who are blind (able to count fingers or less) is 8%. In our population, blindness increased with age and was significantly related to functional impairment. In Zimbabwe cataract is the leading cause of visual loss. In Sub-Saharan Africa, only one in 10 cases of cataract results in surgery [20], and our findings are consistent with this. Since cataract is so common (49% in our study and 40% of over-sixties in Botswana [19]) there are many elderly people with treatable blindness.

A systematic enquiry into recently experienced symptoms revealed that by far the commonest was musculoskeletal pain. Studies throughout the developing world reveal joint pain as an important cause of morbidity in old age [6, 9, 19, 21]. Presumably the main cause is osteoarthritis. Problems such as genito-urinary symptoms, difficulty chewing, hearing loss and insomnia have been identified as common complaints in elderly people in developing countries [6, 9, 10, 19, 21]. Our findings suggest that untreated respiratory, cardiovascular and gastrointestinal symptoms are also important. It is difficult to compare our data on faecal and urinary incontinence to previous studies due to methodological differences [10] and lack of definition of terms [9]. Certain problems such as urinary incontinence, difficulty walking, deafness and difficulty chewing became increasingly common with advancing age. It is not immediately apparent why certain symptoms were more common in either rural or urban respondents, although the possibility that these differences were related to the different ages of the two groups was excluded. The most likely explanation is that the differences reflect lifestyle differences between the two groups or differing thresholds at which symptoms may be complained of, an analysis of which has not been attempted in this study.

Most subjects stated they would choose to visit their local clinic if they were taken ill, however, a number could not get there, or only with assistance. The ability to get to the clinic declined with age. The village health worker system did not seem to be adequately addressing this problem. Although those living in the townships lived closer to their local clinic than those in the rural areas the same percentages had difficulty getting to the clinic in both environments. This was despite the fact that more of the urban elderly were taking medication.

In summary, this study has characterized a group of elderly people who are largely financially self-sufficient, many of whom still work, but who have declining resources with age and receive little help from the social welfare department. Ironically, those who do receive help from the social welfare department tend to be younger. Thirty-eight percent of elderly people have an important family role looking after grandchildren. Less than 4% experienced difficulty with

self-maintenance ADL but 30% had difficulty with instrumental activities. Much disability was due to visual or mobility problems. Elderly people experienced numerous symptoms but had inadequate access to health services and used medication infrequently. Their mobility, vision, hearing, chewing, urinary continence and functional abilities all deteriorated with age, but it was the older subjects who also had most difficulty getting to the clinic. Simple measures such as dentures, hearing aids, cataract surgery, analgesics or mobility aids were only available to the minority or not at all.

Key points

- Life expectancy in Zimbabwe has increased by 10 years in the last decade, leading to a rapidly expanding population aged over 60 years.
- Visual impairment and difficulty walking are the major causes of disability in this group.
- Cataracts are the commonest cause of blindness and are present in 55% but are only operated on in 10% of cases. Ninety-seven percent of people over 60 complain of chronic pain, but only 10% take analgesics. The majority do not have easy access to health services.
- Elderly people are largely financially self-sufficient, 40% still work and only 4% receive help from the social welfare department.

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References

1. Central Statistical Office, Zimbabwe. Census of Population, 1992. Harare: Government Printer.
2. Central Statistical Office, Rhodesia. Census of Population, 1969. Salisbury: Government Printer.
3. Central Statistical Office, Zimbabwe. Population Projections of Zimbabwe, 1982 to 2032. Harare: Government Printer, 1986.
4. Steel K, Maggi S. Ageing as a global issue. *Age Ageing* 1993; 22: 237-9.

5. Fung J, Maggi S, Steel K. For the good health of senior citizens. *World Health Forum* 1993; 14: 145-9.
6. Bella AF, Baiyewu O, Bamigboye A, Adeyemi JD, Ikuesan BA, Jegede RO. The pattern of medical illness in a community of elderly Nigerians. *Central African J Med* 1993; 39: 112-6.
7. Bennett FJ. Old age in rural Buganda. *East African Med J* 1971; 48: 354-66.
8. Bruun FJ, Mugabe M, Coombes Y (eds). The Situation of the Elderly in Botswana, 1994. NIR-SUM Programme on Health Population and Development. Report no. 1.
9. Matuja WBP, Ndosi NK. The elderly patients as seen at Muhimbili Medical Centre, Tanzania. *East African Med J* 1994; 71: 142-5.
10. Wilson AO, Adamchak D, Nyanguru AC, Hampson J. A study of well-being of elderly people in three communities in Zimbabwe. *Age Ageing* 1991; 20: 275-9.
11. Henderson RH, Sundresan T. Cluster sampling to assess immunisation coverage. A review of experience with a simplified sampling method. *Bull WHO* 1982; 60: 253-60.
12. Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW, Cleveland MA. Studies of illness in the aged. The index of ADL: a standardised measure of biological and psychosocial function. *JAMA* 1963; 185: 914-9.
13. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist* 1969; 9: 179-86.
14. Ingstad B, Bruun FJ. Elderly people as care providers and care receivers. In: Bruun FJ, Mugabe M, Coombes Y, eds. The Situation of the Elderly in Botswana, 1994. NIR-SUM Programme on Health, Population and Development. Report no. 1; 69-78.
15. Applegate WB, Blass JP, Williams TF. Instruments for the functional assessment of older patients. *N Engl J Med* 1990; 322: 1207-14.
16. Jitapunkul S, Kamolratanakul P, Ebrahim S. The meaning of activities of daily living in a Thai elderly population: development of a new index. *Age Ageing* 1994; 23: 97-101.
17. Foster A, Johnson G. Blindness in the developing world. *Br J Ophthalmol* 1993; 77: 398-9.
18. Narita AS, Taylor HR. Blindness in the tropics. *Med J Australia* 1993; 159: 416-20.
19. Clausen F, Sandberg E. Morbidity of elderly people at the village level. In: Bruun FJ, Mugabe M, Coombes Y, eds. The Situation of the Elderly in Botswana, 1994. NIR-SUM Programme on Health, Population and Development. Report no. 1; 79-91.
20. Thylefors B. The WHO programme for prevention of blindness and cataract in developing countries. *Documenta Ophthalmologica* 1992; 81: 339-44.
21. Jitapunkul S, Bunnag S, Ebrahim S. Health care for elderly people in developing countries: a case study of Thailand. *Age Ageing* 1993; 22: 377-81.

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