

The Bambuí Health and Aging Study (BHAS): private health plan and medical care utilization by older adults

Projeto Bambuí: plano privado de saúde e utilização de serviços médicos pela população idosa

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Abstract *The aim of this cross sectional study was to investigate whether holding a private health plan affects the consumption of medical services (hospitalization and visits to a doctor) and use of medications by older adults. All residents in Bambuí town (Minas Gerais, Brazil) aged ≥ 60 years ($n = 1,742$) were selected. From these, 92.2% were interviewed and 85.9% were examined (blood tests and physical measurements). After adjustments for counfounders, those under exclusive public coverage ($n = 1,296$), compared with those holding a private health plan ($n = 310$), presented some evidence of having worse health status, reported less visits to a doctor, and used a small number of prescribed medications. The main explanation for the aged holding a private health plan was economic, not health. Even though those who had only public health coverage complained more in relation to medical care (70.9%), an important proportion of the aged with a private health care plan presented some kind of complaint (45.2%). Another worrying factor was the difficulty to acquire medication because of financial problems (47.2 and 25.2% reported, respectively). Further investigations are needed to verify whether our results can be generalized to other communities of the country.*

Key words Aged; Drugs; Health Services

Resumo *O objetivo deste estudo seccional foi investigar se a cobertura de um plano privado de saúde afeta o uso de serviços médicos (consultas e hospitalizações) e o consumo de medicamentos entre idosos. Todos os residentes na cidade de Bambuí (Minas Gerais) com idade ≥ 60 anos ($n = 1.742$) foram selecionados. Destes, 92,2% e 85,9% foram entrevistados e examinados (exames de sangue e medidas físicas), respectivamente. Após ajustamentos por variáveis de confusão, os idosos que dependiam dos serviços públicos ($n = 1.296$), em comparação aos que possuíam plano privado de saúde ($n = 310$), apresentaram evidências de pior condição de saúde, visitaram menos o médico e usaram menor número de medicamentos prescritos. A principal explicação para a cobertura de um plano privado foi econômica e não a condição de saúde. Embora a proporção dos que se queixaram dos serviços médicos tenha sido mais alta entre os que dependiam dos serviços públicos (70,9%), esta queixa também foi importante entre os que possuíam plano de saúde privado (45,2% relataram). O relato de dificuldades para adquirir medicamentos devido a problemas financeiros foi alto (25,2 e 47,2%). Novas investigações são necessárias para determinar se estes resultados são generalizáveis para outras comunidades do país.*

Palavras-chave Idoso; Medicamento; Serviços de Saúde

Introduction

The ageing population, first observed in developed countries, is now also a phenomenon in the developing world. It is estimated that Brazil will be among the top ten countries in size of elderly inhabitants in 2025, with an estimated population of about 27 million people aged ≥ 60 years (WHO, 1998). In five years (1991-1996), the number of elderly in the country increased 8.2% or 1.6 million people (IBGE, 1996). An important consequence of this expanding population is an increasing demand for health and social services. A measurable impact of the increase of the elderly population is evident for instance in the use of hospitals in Brazil. In 1996, those aged ≥ 60 years made up about 22.9% (US\$ 659 million) of the Brazilian public expenditure on hospital care, even though they accounted for 7.9% of the population (DATASUS, 1996; IBGE, 1996).

Brazil has the *Sistema Único de Saúde* (SUS) which is public and provides gratuitous and universal access to comprehensive health care services. The SUS covers 75% of the Brazilian population. In addition, some individuals have private supplemental coverage: in 1995, 20% of the population (around 34 million persons) had private health insurance or health plans (OPAS/OMS, 1998). There is consistent evidence that additional private coverage among older adults is associated with increased health service use (Cohen et al., 1997; Hurd & McGarry, 1997; Link et al., 1980; McCall et al., 1991). We do not know, however, whether this evidence, based on studies carried out in developed countries, can be generalized to developing countries.

The objective of this study was to investigate whether holding an additional private coverage affects the consumption of medical service (hospitalization and visits to a doctor) and use of medications (prescribed and non-prescribed) in a Brazilian community. We used data from the baseline of The Bambui Health and Ageing Study (BHAS), which is a population based prospective study of older adults carried out in the town of Bambui, Minas Gerais State, Southeast Brazil (Lima-Costa et al., 2000). In order to avoid that any possible association between health plan status, and use of health service was influenced by adverse health selection of those holding a private coverage (Hellinger, 1995; Hurd & McGarry, 1997), we investigated the relationship between private health plan status and several indicators of health status. So, an additional objective of the present study was to quantify the importance of adverse health selection in holding a private health plan among older adults.

Material and methods

Study area

The Municipality of Bambuí comprises 20,573 inhabitants, 73% of those living in the urban area (Bambuí town) of the municipality in 1991. The index of Human Development in the community was 0.70, life expectancy was 70.2 years and 75% of the deaths were of people aged ≥ 50 years in 1990-91 (Lima-Costa et al., 2000). The main causes of death for the population in this municipality were stroke (ICD-10: I60-I69), Chagas disease (ICD-10: B57), ischaemic heart disease (ICD-10: I-20-I25), and pulmonary chronic obstructive disease (ICD-10: J43, J44) (death rates = 118.0, 61.4, 42.5 and 18.9 per 100,000 inhabitants, respectively) (DATASUS, 1996; IBGE, 1996). The high mortality due to Chagas disease among residents in this community is the consequence of their past exposure to *Trypanosoma cruzi* infection. Infection transmission appears to have been interrupted around 20 years ago, but seropositivity for *T. cruzi* remains high among older inhabitants due to cohort effect (Lima-Costa et al., 2001).

The town has one general hospital with 62 beds and a municipal outpatient clinic with a 24-hours first-aid sector. Some medications are distributed free by the local public SUS, but provisions are variable and erratic. In 1996 there was one doctor per 1,000 inhabitants in the town (H. L. Guerra, personal communication).

Study population

A complete census was carried out in Bambuí town in November and December 1996 for identification of older adult (aged ≥ 60 years) participants in the baseline of the Bambuí cohort study. All residents of this age were selected for interview, physical measurements and blood tests. Of 1,742 residents aged ≥ 60 years, 92.2% participated in the interview and 85.9% were examined (blood tests and physical measurements). Participants in the interview and in the examinations were similar to the town population of this age in all the characteristics considered: age, gender, number of residents in the household, marital status, family income and education (Lima-Costa et al., 2000).

Interview

The following variables from the baseline BHAS interview were considered in this study: (1) sociodemographic characteristics (age, gen-

der, number of years of schooling and monthly family income), (2) medical history for selected diseases diagnosis (*has a doctor ever said you had*: angina pectoris, myocardial infarction, diabetes or other chronic condition); (3) selected indicators of social support or social ties (satisfaction with social network, satisfaction with free time arrangements and presence of an informal caregiver); (4) lifestyle (lifetime smoking habits and frequency of alcohol consumption in past 12 months); (5) self-rated health in previous 6 months; (6) selected measures of physical performance (level of difficulty to walk 300 meters and ability to perform at least one of the following activities of daily living: bathing, dressing, transferring from bed to chair, using the toilet or eating); (7) other health status indicators (impossibility to perform any routine activity because of a health problem in past 2 weeks, and staying in bed during past 2 weeks); (8) use of health care facilities (visits to doctors in past 12 months and hospitalization for at least one night in past 12 months); (9) use of medications (number of prescribed and non prescribed medications in previous 3 months); (10) main reason for dissatisfaction when seeking medical care or medication; (11) source of health care (private health plan or public SUS only).

When a respondent was unable to participate because of cognitive deficit or for some other health reason, an appropriate proxy was used (Nelson et al., 1990). They were not asked questions that required personal judgement, such as self-rated health, satisfaction with social network or satisfaction with free time arrangements (Lima-Costa et al., 2000).

Blood pressure and anthropometric measurements

Blood pressure measurements (BP) were performed 30 or more minutes after the last caffeine intake or cigarette smoked, and three measures were taken after 5 minutes of initial rest and subsequently at 2-minute interval (Anonymous, 1993). In this study BP was considered as the arithmetic mean of the second and third measurements. The nutritional indicator used was body mass index (weight/square height). All measures were performed by specially trained health technicians, using standard equipments (Lima-Costa et al., 2000).

Blood tests

Serum samples of all participants in this study were investigated for the presence of *T. cruzi*

antibodies by two commercial assays, an indirect hemagglutination assay (IHA) and an enzyme-linked immunosorbent assay (ELISA) (Biolab and Abbott Laboratories, Brazil, respectively); seropositivity was defined when the two samples showed positive results. Blood tests included biochemical analysis for total cholesterol, HDL cholesterol and tryglicerides, using an automated analyzer (*Eclipse Vitalab*, Merck, Netherlands).

Interviews, physical measurements, blood samples and blood tests of all participants were accomplished between January and August 1997. A free and signed informed consent of all participants was obtained. Further details are described elsewhere (Lima-Costa et al., 2000).

Data analysis

Crude analysis was based on the Wilcoxon rank test (for medians) and on Pearson chi-square or chi-square test for linear trend (for proportions) (Armitage & Berry, 1987). Multivariate analysis was based on the adjusted odds ratios and their 95% confidence intervals (Woolf's method); odds ratios were adjusted using multivariate logistic regression method (Hosmer & Lemenshow, 1989). All variables associated with holding a private health plan beyond 0.20 level in the univariate analysis were included in the initial logistic model (Greenland, 1989). When two variables were highly correlated, such as schooling and monthly family income, only the one strongly related with private health plan status (schooling) was included in the logistic model. The analysis was carried out using the Stata statistical software (Stata Corporation, 1997).

Results

Among the 1,606 participants in this study, 310 (19.3%) had private health plan and 1,296 (80.7%) were exclusively under the SUS public cover. Among the former, 134 individuals were covered by employment based health plan, 115 were covered by medical co-operative and 61 were covered by other types of private health plan.

The distribution of sociodemographic characteristics according to private health plan status is shown in Table 1. Educational level ($p < 0.001$) and monthly family income ($p < 0.001$) were both significantly associated with holding private health plan. No significant associations between gender ($p = 0.202$) or age ($p = 0.804$) and private health plan status were found.

Table 1

Distribution of selected sociodemographic characteristics among older adults, according to private health plan status. Bambuí, Minas Gerais State, Brazil, 1997.

Sociodemographic characteristics	Private health plan (%)	
	Yes (n = 310)	No (n = 1,296)
Gender		
Male	43.2	39.3
Female	56.8	60.7
	p = 0.202	
Age (years)		
60-64	34.8	32.3
65-69	24.8	25.4
70-74	19.0	18.9
≥ 75	21.3	23.4
	p = 0.804	
Schooling (years)		
None	13.2	37.1
1-3	22.9	35.0
4-7	38.4	24.1
≥ 8	25.2	3.4
Not informed	0.3	0.4
	p' < 0.001	
Monthly family income*		
< 2.0	13.2	33.6
2.0-3.9	25.5	40.4
4.0-5.9	18.1	14.0
≥ 6.0	42.9	10.9
Not informed	0.3	1.2
	p' < 0.001	

* in Brazilian minimum wages (each = US\$ 120.00 during the study period)

p = p value (Pearson's chi square test)

p' = p value (chi square for linear trend)

Participants covered by private health plan regarded themselves healthier in past six months ($p < 0.001$) and reported lower levels of difficulty to walk 300 meters ($p < 0.001$) than those without private coverage. In relation to health problems in the two weeks prior to interview, the aged covered by private health plan were less likely to report inability to perform routine activity because of a health problem ($p = 0.002$) and to have stayed in bed ($p = 0.007$). Those covered by private health plan reported less inability in one or more ADLs (2.9 vs. 5.2%, respectively) but the difference was not statistically significant ($p = 0.083$). No association between report of previous diagnosis of coronary heart disease (myocardial infarction or angina *pectoris*) ($p = 0.696$), diabetes ($p = 0.373$) or other chronic condition ($p = 0.501$) and health plan status was found (Table 2).

The associations between health plan status and seropositivity for *T. cruzi* and other

health conditions are presented in Table 3. Seropositivity for *T. cruzi* was less frequent among those under private coverage ($p < 0.001$). Median body mass index was higher among those who had a private health plan ($p = 0.001$). No significant differences between those with and without private health coverage were found regarding median systolic blood pressure ($p = 0.218$), median diastolic blood pressure ($p = 0.254$), total cholesterol ($p = 0.834$), HDL cholesterol ($p = 0.937$) or triglycerides level ($p = 0.265$).

No association between satisfaction with social network ($p = 0.288$), satisfaction with free time arrangements ($p = 0.535$), presence of an informal caregiver ($p = 0.981$) or frequency of alcohol consumption during past 12 months ($p = 0.188$) and private health plan status was found. Current smoking was less frequent among those who had private coverage in comparison with those without it (26.1 and 11.9% vs. 22.3 and 20.5% were ex-smokers or still smoked, respectively; $p = 0.008$).

Table 4 shows the distribution of number of visits to a doctor, number of hospitalizations in past 12 months, and number of prescribed and non prescribed medications used in past 3 months, according to health plan status. The number of visits to a doctor were significantly higher among those with private coverage ($p = 0.010$). Those who had private coverage used more prescribed ($p < 0.001$) and non-prescribed ($p = 0.010$) medications. A higher proportion of those under exclusive public coverage had two or more hospitalisations in past 12 months (7.8 vs. 3.9%), but the difference was at the borderline of significance ($p = 0.056$).

Significant results ($p < 0.05$) of the multivariate analysis of factors associated with holding a private health plan are presented in Table 5. Education was the factor most strongly associated with holding a private coverage: $_{Adj}OR = 1.60$ (95%CI: 1.06-2.41), $_{Adj}OR = 13.82$ (95%CI: 2.58-5.66), and $_{Adj}OR = 16.10$ (95%CI: 9.69-26.76) for those with 1-3, 4-7 and ≥ 8 years of schooling, respectively. Older adults covered by private health plan were less likely to perceive their health as bad/very bad ($_{Adj}OR = 0.47$; 95%CI: 0.30, 0.73), to need a proxy respondent ($_{Adj}OR = 0.11$; 95%CI: 0.03, 0.47), as well as to report inability to perform routine activities because of a health problem in past 2 weeks ($_{Adj}OR = 0.54$; 95%CI: 0.35, 0.85). Holding a private health plan was independently associated with a greater number of visits to a doctor in past 12 months ($_{Adj}OR = 1.62$; 95%CI: 1.02, 2.62 for those who reported ≥ 4 visits), as well as with use of higher numbers of prescribed med-

Table 2

Distribution of selected indicators of health status among older adults, according to private health plan status.
Bambui, Minas Gerais State, Brazil, 1997.

Indicator of health status	Private health plan (%)	
	Yes (n = 310)	No (n = 1,296)
Self rated health in past 6 months		
Bad/very bad	17.7	26.2
Reasonable	49.0	45.7
Very good/good	32.6	21.1
Not informed (proxy respondent)	0.7	6.8
Nor informed	0.0	0.2
		p' < 0.001
Unable to perform one or more ADL*		
No	97.0	94.8
Yes	2.9	5.2
		p = 0.083
Level of difficulty to walk 300 meters		
Unable/much	13.6	23.3
Some	17.7	20.9
None	68.7	55.5
Not informed	0.0	0.3
		p' < 0.001
Unable to perform routine activities because of a health problem in past 2 weeks		
Yes	10.3	18.6
No	89.7	81.3
Not informed	0.0	0.2
		p = 0.002
Stayed in bed in past 2 weeks		
Yes	5.5	11.3
No	94.5	88.5
Not informed	0.0	0.2
		p = 0.007
Report of medical diagnosis of coronary heart disease		
Yes	10.3	10.9
No	89.0	88.0
Not informed	0.7	1.1
		p = 0.696
Report of medical diagnosis of diabetes		
Yes	12.9	11.1
No	87.1	88.9
		p = 0.373
Report of medical diagnosis of other chronic condition		
Yes	57.7	55.6
No	42.3	44.3
		p = 0.501

* Activities of daily living (bathing, dressing, transferring, using the toilet or eating)

p = p value (Pearson's chi square test)

p' = p value (chi square for linear trend)

Table 3

Distribution of seropositivity for *Trypanosoma cruzi* and other health conditions among older adults, according to private health plan status. Bambui, Minas Gerais State, Brazil, 1997.

Seropositivity for <i>T. cruzi</i> and other health condition	Private health plan		p value
	Yes (n = 298) % or median (p25-p75)	No (n = 1,196) % or median (p25-p75)	
Seropositive for <i>T. cruzi</i>	24.9%	40.9%	p < 0.001
Median systolic blood pressure	135 (122-148)	135 (122-151)	p" = 0.218
Median diastolic blood pressure	82 (75-90)	82 (75-91)	p" = 0.254
Total cholesterol	227 (203-262)	228 (199-263)	p" = 0.834
HDL cholesterol	47 (38-58)	47 (39-57)	p" = 0.937
Trygliceride	132 (94-189)	130 (90-182)	p" = 0.265
Body mass index	25.5 (22.9-28.5)	24.6 (21.4-27.8)	p" = 0.001

p25 = 25 percentile

p75 = 75 percentile

p = p value (Pearson's chi square test)

p" = p value (Wilcoxon rank test)

Table 4

Distribution of indicators for the use of health-care services among older adults, according to private health plan status. Bambui, Minas Gerais State, Brazil, 1997.

Characteristics	Private health plan (%)		
	Yes (n = 310)	No (n = 1,296)	
Number of visits to a doctor in past 12 months			
None	15.2	20.4	
1-3	47.7	48.8	
≥ 4	37.1	30.9	
			p' = 0.010
Number of hospitalizations in past 12 months			
None	80.0	76.8	
1	16.1	15.4	
≥ 2	3.9	7.8	
			p' = 0.056
Number of prescribed medications used in past 3 months			
None	14.5	21.6	
1-2	25.8	29.5	
3-4	29.7	28.0	
≥ 5	30.0	20.9	
			p' < 0.001
Number of non-prescribed medications used in past 3 months			
None	85.5	82.3	
1	10.3	12.5	
≥ 2	4.2	5.2	
			p' = 0.010

p' = p value (chi square for linear trend)

ication (Adj-OR = 1.75; 95%CI: 1.09-2.82 and Adj-OR = 2.81; 95%CI: 1.71-4.63 for those who reported 3-4 and ≥ 5 medicines used in past 3 months, respectively).

Family income was consistently associated with holding a private health plan after adjustments for indicators of health status (self rated health and a report of inability to perform routine activities because of a health problem in past 2 weeks) and indicators of the use of health-care services (number of visits to a doctor in past 12 months and number of prescribed): OR = 2.94 (95%CI: 1.89-4.61) and OR = 8.01 (95%CI: 5.29-12.12) for those whose monthly family income were 4.0-5.9 and ≥ 6.0 Brazilian minimum wages, respectively.

Older adults covered by private medical plan reported less dissatisfaction when seeking medical care than those under exclusive public covering (29.1% vs. 54.8%, respectively), and they complained of less difficulties to: pay for medical care (9.0 vs. 17.2%), make a medical appointment because of existing lines (10.8 vs. 21.3%) or other problems (25.4 vs. 32.4%) (p < 0.001) (Figure 1). Those covered by private plan also reported less dissatisfaction when needing a medication (44.9 vs. 68.7%) and they complained of less difficulties in buying medicine (25.2 vs. 47.1) or other problems (6.1 vs. 8.2%) (p < 0.001) (Figure 2).

Discussion

In this population based study we found that number of visits to a doctor and the number of prescribed medications used were higher among elderly people holding private supplemental health plans. We did not find evidence of adverse health selection among those with private health plans.. On the contrary, those under exclusive SUS public coverage presented some evidence of having worse health status.

Previous work examining the presence of adverse health selection among elderly people with private coverage has provided conflicting results (Eggers & Prihoda, 1982; Hellinger, 1995; Hurd & McGarry, 1997; Wolfe & Godderis, 1991). An important concern regarding these results was that studying the relationship between private purchase and health without controlling the economic status could obscure any adverse selection (Hurd & McGarry, 1997). In our study, two indicators of worse health status (self rated health as bad or very bad and inability to perform routine activities due to a health problem in prior 2 weeks) were found to be associated with exclusive public SUS cover-

Table 5

Significant results of the multivariate analysis of factors associated with holding a private health plan among older adults. Bambui, Minas Gerais State, Brazil, 1997.

Factors	OR (95% CI)
Indicator of socioeconomic status	
Schooling (years)	
None	1.00
1-3	1.60 (1.06-2.41)
4-7	3.82 (2.58-5.66)
≥ 8	16.10 (9.69-26.76)
Indicators of health status	
Self rated health	
Very good/good	1.00
Reasonable	0.75 (0.53-1.06)
Bad/very bad	0.47 (0.30-0.73)
Not informed (proxy respondent)	0.11 (0.03-0.47)
Unable to perform routine activities because of a health problem in past 2 weeks	
No	1.00
Yes	0.54 (0.35-0.85)
Indicator of use of health-care services	
Number of visits to a doctor in past 12 months	
None	1.00
1-3	1.13 (0.74-1.72)
≥ 4	1.62 (1.02-2.62)
Number of prescribed medications used in past 3 months	
None	1.00
1-2	1.43 (0.92-2.23)
3-4	1.75 (1.09-2.82)
≥ 5	2.81 (1.71-4.63)

OR (95% CI) = Odds ratios and 95% confidence intervals adjusted by multiple logistic regression analysis for all variables listed on the table (1,596 individuals participated in the final analysis)

age after adjustment for several confounding variables, including education which was highly correlated with family income.

In our study, health status could not explain lower frequency of visits to a doctor and lesser number of prescribed medications of older adults with exclusive public coverage. On the contrary, our results indicate that those under exclusive SUS coverage had worse health indicators and, as a consequence, one could speculate that they had more needs for health services. Their lower number of visits to a doctor in comparison with those with private health plan might be partly explained by problems of having access to medical care, that is: (1) difficulty to make a medical appointment because

Figure 1

Distribution of main reasons for dissatisfaction identified by older adults when seeking medical care, according to private health plan status. Bambuí, Minas Gerais State, Brazil, 1997.

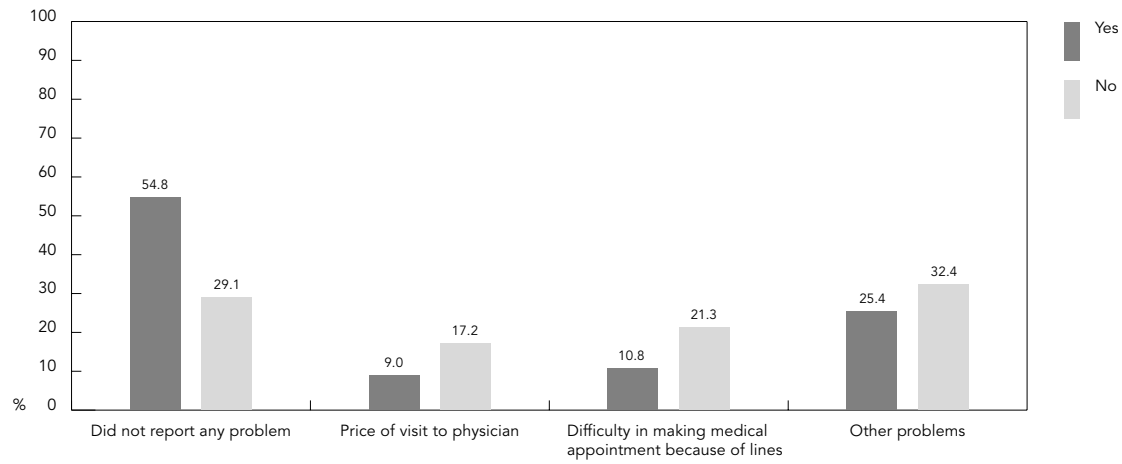
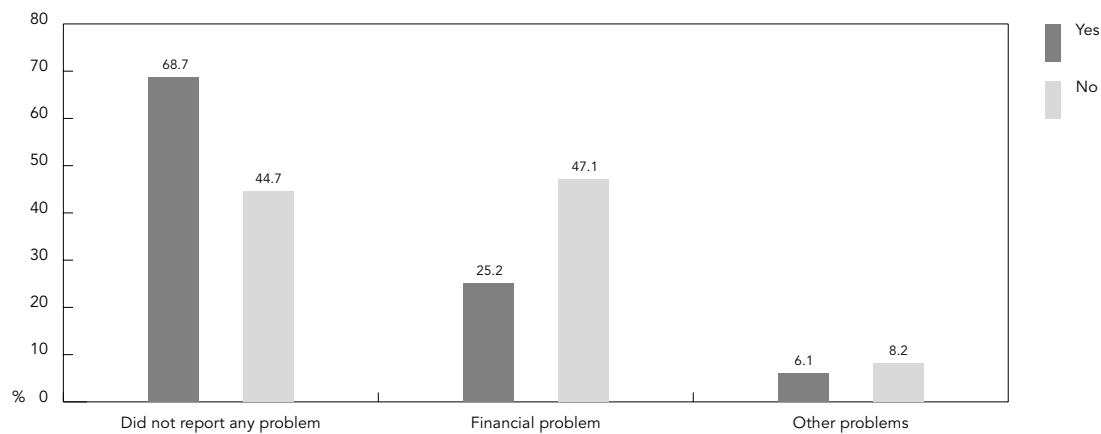


Figure 2

Distribution of main reasons for dissatisfaction identified by older adults when attempting to obtain medication, according to private health plan status. Bambuí, Minas Gerais State, Brazil, 1997.



of the existing lines, (2) consultation price, and (3) other problems. Existing lines are of a managerial order and could be solved with better administration of public health services. The second complaint (price of medical services), reported by 17.2% of the aged population who did not have private health plan, suggest that they attempt to obtain other forms of medical care in private surgeries, but have economic difficulties to purchase such care.

Financial problems were also appointed as the main difficulty to obtain medication. Even though this complaint was more frequent among the aged under exclusive SUS public coverage (47.1%), it was also reported by those who had private health plan (25.2%).

Years of schooling and monthly family income were both strongly associated with private health plan status. This result, together with no evidence of adverse health selection in our study, agrees with previous observations in developed countries that the explanation for the purchase of supplemental coverage is the economic resource of the elderly (or his family), not health (Hurd & McGarry, 1997; Sloan & Conover, 1998).

The proportion of elderly holding private health plan in our study is small (around 20%) and similar to that estimated for Brazil (PAHO, 1999). In a study developed in a large Brazilian city (Rio de Janeiro), around 57-88% of the aged had private health plan, this proportion being greater in high income areas of the city (Pinheiro & Travassos, 1999). The results of our study are consonant with the low socioeconomic level of the study community.

Regarding methodological aspects, several steps were followed to minimize bias in this study (Lima-Costa et al., 2000): internal validity, information double blinded, assessment of the reliability of the data gathered, standardized procedures and instruments, and inclusion in data analysis of several potential confounding variables. The choice of exploratory variables in this work took into consideration

their importance as predictors of health care use (Hurd & McGarry, 1997; Mor et al., 1994; Pacala et al., 1993) and mortality (Bernard et al., 1997; Korten et al., 1999; Menec et al., 1999; Penninx et al., 1997). Nevertheless, one cannot be sure that an unknown confounding variable has not been included in the analysis.

Conclusions

Summarizing, our results showed that older adults in the studied community were highly dependent on the public health system. In comparison with those with private health plan, the 80% of the aged who were under exclusive public SUS cover presented some evidence of having worse health status, reported less visits to a doctor, and used lower number of prescribed medications. Confirming previous observations from developed countries (Hurd & McGarry, 1997; Sloan & Conover, 1998), we found that the explanation for holding a private health plan in the studied population was economic, not health. In general, even though the aged who had only public health coverage complained more in relation to medical care (70.9% reported some kind of problem), an important proportion (45.2%) of the aged people with supplemental health plan also presented some kind of complaint. Another worrying factor was the difficulty to acquire medicines because of financial problems: 47.2% and 25.2% of those without and with supplemental health plan reported financial problems, respectively. To our knowledge, this study represents the first effort to examine the associations between private health plan status, health care services and medication use, as well as adverse health selection among older adults in a Brazilian community. Further investigations are needed to verify whether our results can be generalized to other communities of the country.

Acknowledgments

This work was sponsored by the *Financiadora de Estudos e Projetos* (FINEP), Rio de Janeiro, Brazil (Process 66940009-00). The *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPq) sponsored authors' scholarships (Processes 520337/96-4, 301056/94-3 142974/97-8 and 300908/95-4).

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Submitted on 23 October 2000

Final version resubmitted on 26 January 2001

Approved 8 April 2001