The influence of federal health care policy reforms on the use of private health insurance in disadvantaged groups

Rachael Moorin and C D'Arcy J Holman

Abstract

Objective: To examine changes in the incidence rate ratio of private health insurance (PHI) and Medicare use for episodes of hospitalisation as a function of socio-economic status and accessibility to evaluate the impact of federal health policy reforms.

Methods: The WA Data Linkage System was used to extract all hospital morbidity records in Western Australia from 1991, 1996 and 2001. Adjusted odds ratios of PHI use were estimated in each socio-economic and locational accessibility category in each year using logistic regression. The odds ratios were then converted to adjusted incidence rate ratios controlled for population size.

Results: In all cases between 1991 and 1996 the adjusted incident rate ratios fell; this was followed by an increase in the adjusted rate ratio in 2001 to levels near those of 1991 in the most accessible–highest socio-economically advantaged group. However in all other groups the increase fell short of the 1991 levels. The magnitude of the shortfall was associated with worsening accessibility or socio-economic status. In addition, significant changes in the within-group differential incident rate ratios were also observed over time.

Conclusion: Our study indicates that the recent federal government policies which were aimed at making PHI more affordable to, and therefore more widely used by, lower to middle income earners were successful, lending empirical support for price elasticity of demand for PHI. Our results also indicate that the magnitude of their success varied according to disadvantage, suggesting that this elasticity is variable across both the level and typology of disadvantage.

What is known about the topic?

Policies such as the Medicare levy surcharge (1997), the 30% rebate (1999), Gap Cover (1997) and Lifetime Health Cover (2000) have been components of a package of incentives and penalties designed to reverse the trend of declining PHI membership.

What does this paper add?

This paper examines the success of these policies aimed at improving the attractiveness of PHI from the standpoint of groups with different levels and typology of advantage or disadvantage. Using changes in the rate of PHI versus Medicare use for episodes of hospitalisation, this study evaluates the impact of federal health care policy reforms on equity and access to health care in groups with differing levels of disadvantage.

What are the implications for practitioners?

The recent federal government policies aimed at making PHI more affordable appear to have been successful as evidenced by the observed increase in the ratio of PHI use by disadvantaged and extremely disadvantaged groups. However, our results also suggest that policies aimed at increasing the affordability of PHI have not addressed disadvantage based on locational accessibility. ◆

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ALTHOUGH MEDICARE, the compulsory tax-funded health insurance scheme introduced in 1984, has strong public support in Australia, concerns have been expressed over waiting times and queues. In the design of Medicare, private health insurance (PHI) was seen as a practical way of allowing those with the financial means and a strong preference for choice of treating physician to participate in an additional private hospital market segment ("opting up") without opting out of the universal scheme to which they had also

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contributed.[1] PHI could fund their extra demands in a regulated way by providing a mechanism to ensure choice in service provision and reducing pressures on the public system. Maintaining this choice has been the cornerstone of the recent PHI reforms in Australia. Policies such as the Medicare levy surcharge (1997), the 30% rebate (1999), Gap Cover (1997) and Lifetime Health Cover (2000), have been components of a package of incentives and penalties designed to reverse the trend of declining PHI membership.[2]

A socio-economic gradient is known to exist, whereby wealthier and more highly educated people experience better health than those who are poorer and less educated.[3] A survey of perceptions of the health system in five countries, which included Australia, found that the problems of accessing health care for lower income groups persisted even in the scenario of universal health insurance coverage.[4] The authors found that waiting time for surgery was particularly sensitive to possession of PHI when the private sector could be used for differential access to hospitals or specialists, such as is the case in Australia. Further, the authors found that copayments, even at relatively low levels, resulted in perceived financial burdens and access problems for lower income families. In addition to the socio-economic gradient, there has also been evidence of poorer health status in rural and remote residents[5] due to disproportionate difficulty in accessing health care services.[6-8] Several studies have indicated that the use of health services tends to be highest in populations living close to them when adjusted for severity of illness.[9,10]

In Australia, the prevalence of possessing PHI has been found to rise with income such that in 1992–93, 70% of the wealthiest households were privately insured, while fewer than 20% of the lowest income households were insured.[11] In 1997, the PHI Incentive Scheme was introduced (replaced by a non-means tested version in 1999) which was specifically aimed at making PHI more affordable by providing either reduced premiums or a tax offset.[12] Other policies have been aimed at the attractiveness of PHI, for example the Medicare surcharge; and product deficiencies, for example Gap Cover, informed financial consent, simplified billing and discounted premiums.[13] The success of these policies has not been analysed from the standpoint of groups with different levels and typology of advantage or disadvantage.

The aim of this study was to examine changes in the rate of PHI as compared with Medicare use for episodes of hospitalisation as a function of socio-economic status and locational accessibility to services before the major decline in membership of PHI (1991), at the peak of the decline (1996) and following implementation of the PHI reforms (2001) so as to evaluate the impact of federal health care policy reforms on equity and access to health care in groups with differing levels of disadvantage.

Methods

Linked data and case selection

The WA Data Linkage System[14] was used to extract all hospital morbidity records from 1991, 1996 and 2001, comprising encrypted patient identification and episode numbers, age, gender, indigenous status, postcode, collectors' district, date of admission, date of separation and payment classification (public, uninsured private, insured private, or "other"), diagnosis related group (DRG), principal condition and principal procedure for each individual episode of hospitalisation. The "other" payment category (7.3% of admissions), which included workers compensation, motor vehicle, defence force personnel and Veterans' Affairs patients, and the private uninsured payment category (2.2%) were removed from the dataset, leaving only the categories of public and private insured. This was done because the study was principally concerned with elective shifts between the PHI and public categories; not enforced payment classifications due to mandatory funding arrangements or individuals wishing to self-insure.

Assignment of socio-economic status

A score of socio-economic disadvantage was determined for each episode of hospitalisation by transformation of the collectors' district (CD), or

postcode where collectors' district was unavailable, into numeric values of social disadvantage using the SEIFA (Socio-Economic Indexes for Areas) system of the Australian Bureau of Statistics.[15] An index of relative socio-economic status for Western Australia was constructed by partitioning the continuous SEIFA values into quintiles to create five ordinal categories: extreme advantage, advantaged, average, disadvantaged, and extreme disadvantage.

Assignment of an accessibility/remoteness score

An accessibility/remoteness score for each episode of hospitalisation was constructed using the Accessibility and Remoteness Index of Australia (ARIA) based on CD and postcodes.[16] The classification system was that recommended by the Commonwealth Department of Health and Aged Care[17] and grouped the continuous ARIA values into five ordinal categories: highly accessible, accessible, moderately accessible, remote and very remote locations.

Stratification by age and clinical categories

Assignment of a broad clinical category to each hospital record was performed using either the recorded DRG, or where no DRG was recorded, by examining the combination of principal procedure and principal condition recorded and determining the most appropriate DRG. Five broad clinical categories were assigned (surgical, medical, psychiatric, obstetric, and paediatric), where paediatric was the default broad clinical category assigned to all episodes involving individuals aged 16 years of age or under. The remaining four categories were those conventionally assigned to each particular DRG.

Episodes of hospitalisation were determined for each individual in the dataset using the separation and admission dates to define temporally contiguous records of health care service utilisation. Thus one episode of hospitalisation may contain one or more interhospital transfers. For the purposes of assigning clinical categories to episodes of hospitalisation, the clinical category assigned to the first record in a series where interhospital transfers were involved was deemed the clinical category for that entire episode of hospitalisation.

Each episode of hospitalisation was assigned to one of four broad age categories (0–16 years, 17–39 years, 40–69 years and 70+ years) allocated on the basis of age at admission date for the first hospital record of that series, where multiple records made up one episode of care. Thus it was possible for a single individual to fall into multiple age groups across multiple episodes, but only one age group for each individual episode regardless of duration.

Estimation of the crude incidence rate ratio

The total population at risk in all SEIFA and ARIA categories was enumerated using 1991, 1996 and 2001 census data stratified by postcode. SEIFA or ARIA values were assigned to each postcode in the census data file in the same manner as previously described for the hospital morbidity data. The total population in each of the five SEIFA and ARIA categories was estimated by summing those of individual postcodes within each category. The total number of episodes of hospitalisation in each payment category (public and privately insured) in each year was calculated according to socio-economic status and accessibility/remoteness.

The crude rate ratio of hospitalisation as a privately insured patient versus a public (Medicare) patient in each of the five SEIFA and ARIA categories in 1991, 1996 and 2001 was calculated assuming that each group's (SEIFA or ARIA category) exposure was proportional to its population. Thus the crude rate ratios were independent of population size.

Estimation of the odds ratio

The odds ratio of hospitalisation as a privately insured patient in each SEIFA/ARIA category relative to that of hospitalisation as a privately insured patient in the category representing the lowest socio-economic or least accessible group was estimated in 1991, 1996 and 2001 using a logistic regression model that controlled for age, gender, indigenous status, broad clinical category, and either socio-economic status or locational accessibility to services.

1 The distribution of hospital episodes according to ARIA and SEIFA categories in 1991, 1996 and 2001

	1991		1996		2001	
	No of episodes	%	No of episodes	%	No of episodes	%
ARIA* category: accessibility to services						
Highly accessible	262 244	74.0	351 449	76.5	458 707	79.4
Accessible	28 502	8.0	34 509	7.5	40 973	7.1
Moderately accessible	28 539	8.1	33 258	7.2	34 522	6.0
Remote	9 373	2.6	11 019	2.4	12 763	2.2
Very remote	25 737	7.3	29 114	6.3	30 843	5.3
Total	354 395		459 349		577 808	
SEIFA† category: socio-economic status						
Extremely advantaged	67 298	19.0	86 409	18.8	121 608	21.0
Advantaged	70 426	19.9	94 442	20.6	116 061	20.1
Average	72 257	20.4	93 713	20.4	113 120	19.6
Disadvantaged	72 094	20.3	91 589	19.9	107 210	18.6
Extremely disadvantaged	72 320	20.4	93 196	20.3	119 809	20.7
Total	354 395		459 349		577 808	

* Accessibility and Remoteness Index of Australia.[16] † Socio-Economic Indexes for Areas.[15] ◆

Estimation of adjusted incidence rate ratio

Incidence rate ratios, adjusted for age, gender, indigenous status, broad clinical category, and either socio-economic status or locational accessibility to services were estimated by multiplying the crude incidence rate ratio in the baseline (the lowest socio-economic or least accessible group) category by each of the odds ratios estimated above in each time period. Thus, adjusted incidence rate ratios were estimated in 1991, 1996 and 2001 for hospitalisation as a privately insured patient versus a public (Medicare) patient in all but the baseline SEIFA/ARIA category, enabling temporal comparison of rates both across and within socio-economic and locational accessibility groups.

Results

Characteristics of individuals and episodes in the data file

The data file contained 1 391 552 episodes of hospitalisation. Box 1 shows the distribution of hospital episodes according to ARIA and SEIFA categories in 1991, 1996 and 2001. The distributions by ARIA category were highly skewed because, unlike the use of SEIFA quintiles, the ARIA system classifies an area relative to a predefined consistent national standard.

Changes in the crude rate of hospitalisation using PHI versus Medicare as a function of locational accessibility

In all ARIA categories, in all years, the crude rate of using PHI for inpatient care was significantly lower compared with that estimated for hospitalisation as a public patient (Box 2). The magnitude of the reduced rate was inversely associated with accessibility, thus the more accessible the services were to the patient's location the greater the rate of PHI use. In 1991 the largest incremental difference in rate between ARIA categories was observed between the remote and very remote categories. In 1996 and 2001 however, the largest incremental changes were observed both between the remote and very remote, and also between the highly accessible and accessible categories.

2 Crude incidence rate ratio of hospitalisation using private health insurance (PHI) versus using Medicare in 1991, 1996 and 2001 as a function of locational accessibility to services and socio-economic status.

Locational accessibility to services*	IRR† (95% CI)	Socio-economic status‡	IRR† (95% CI)
1991		1991	
Highly accessible	0.66 (0.65–0.67)	Extreme advantage	1.22 (1.20–1.24)
Accessible	0.50 (0.49–0.52)	Advantaged	0.73 (0.72–0.74)
Moderately accessible	0.49 (0.47–0.51)	Average	0.60 (0.59–0.61)
Remote	0.45 (0.43–0.47)	Disadvantaged	0.44 (0.44–0.45)
Very remote	0.18 (0.17–0.19)	Extreme disadvantaged	0.25 (0.24–0.25)
1996		1996	
Highly accessible	0.57 (0.56–0.57)	Extreme advantage	1.12 (1.11–1.14)
Accessible	0.38 (0.37–0.39)	Advantaged	0.59 (0.58–0.60)
Moderately accessible	0.33 (0.32–0.33)	Average	0.47 (0.46–0.47)
Remote	0.28 (0.26–0.29)	Disadvantaged	0.34 (0.34–0.35)
Very remote	0.10 (0.09–0.10)	Extreme disadvantaged	0.21 (0.20–0.21)
2001		2001	
Highly accessible	0.63 (0.62–0.63)	Extreme advantage	1.21 (1.20–1.23)
Accessible	0.39 (0.38–0.40)	Advantaged	0.63 (0.62–0.64)
Moderately accessible	0.34 (0.33–0.35)	Average	0.50 (0.49–0.50)
Remote	0.32 (0.31–0.33)	Disadvantaged	0.40 (0.39–0.40)
Very remote	0.09 (0.08–0.10)	Extreme disadvantaged	0.24 (0.23–0.24)

* As measured by the accessibility and remoteness index of Australia (ARIA). † Incidence rate ratio of hospitalisation using PHI versus Medicare normalised by the population of Western Australia at risk. ‡ As measured by socio-economic indices for areas (SEIFA). ◆

Changes in the crude rate of hospitalisation using PHI versus Medicare as a function of socio-economic status

In all socio-economic groups except the extreme advantaged, over all 3 years of observation the crude rate of using PHI for inpatient care was significantly lower than the crude rate of hospitalisation as a public patient (Box 2). The magnitude of the reduction in rate was positively correlated with socio-economic disadvantage, with the largest incremental difference in the rate ratio estimate being greatest between the extreme advantaged and advantaged groups in all years.

Changes in the adjusted odds ratio of hospitalisation using PHI by locational accessibility

Box 3 shows the odds ratios of hospitalisation using PHI adjusted for gender, age, indigenous status, broad clinical category and socio-economic status relative to the group with least access to services. In 1991, only the moderately accessible group showed a significantly different odds ratio compared with the adjacent more accessible group, however, in 1996, both the accessible and moderately accessible groups showed a significantly different odds ratio, while

3 Odds ratios* for hospital episodes using private health insurance in 1991, 1996 and 2001, by degree of locational accessibility and socio-economic status.

	1991 OR (95% CI)	1996 OR (95% CI)	2001 OR (95% CI)
Locational accessibility to services			
Highly accessible v very remote	1.739 (1.673–1.807)	2.180 (2.085–2.280)	2.356 (2.250–2.468)
Accessible v very remote	1.695 (1.618–1.776)	1.947 (1.850–2.049)	1.825 (1.733–1.923)
Moderately accessible v very remote	1.544 (1.474–1.616)	1.656 (1.573–1.743)	1.741 (1.652–1.836)
Remote v very remote	1.816 (1.710–1.928)	1.710 (1.603–1.825)	2.276 (2.134–2.428)
Socio-economic status			
Extreme advantage v extreme disadvantage	3.925 (3.829–4.022)	4.181 (4.088–4.277)	4.030 (3.951–4.111)
Advantage v extreme disadvantage	2.505 (2.445–2.567)	2.444 (2.389–2.499)	2.274 (2.229–2.321)
Average v extreme disadvantage	2.168 (2.114–2.223)	2.002 (1.956–2.049)	1.802 (1.764–1.840)
Disadvantage v extreme disadvantage	1.561 (1.521–1.601)	1.462 (1.428–1.498)	1.501 (1.468–1.534)

* Odds ratios are adjusted for gender, indigenous status, age, broad clinical category and either locational accessibility or socio-economic status. ◆

in 2001 the accessible and remote groups showed a significantly different odds ratio. Thus the role of locational accessibility on the odds of hospitalisation using PHI appeared to increase over time. In 1991 and 2001 no significant difference was observed between the highly accessible and the remote locational groups. However, in 1996 and 2001 a significantly different odds ratio between these two groups was observed. Further in 2001, the odds ratio of hospitalisation using PHI in both the highly accessible and remote locational groups was significantly greater than one. Thus the differential odds of hospitalisation using PHI between the highest and lowest accessible groups appeared to increase over time.

Changes in the adjusted odds ratio of hospitalisation using PHI by socio-economic status

Box 3 shows the odds ratios of hospitalisation using PHI adjusted for gender, age, indigenous status, broad clinical category and locational accessibility to services relative to the group with lowest socio-economic status. The magnitude of difference in the odds of hospitalisation using PHI in all socio-economic groups compared with the baseline group was larger than observed for locational accessibility. In addition, for socio-economic status the odds ratios were significantly different in all adjacent socio-economic groups. Thus it appeared that changes in socio-economic status have a greater influence on the odds of using PHI than locational accessibility. This general pattern was observed in all 3 years, however, the magnitude of the difference in odds ratio in adjacent categories varied over time. In 1991 and 1996 the largest incremental change in odds ratio was observed between the extreme advantaged and advantaged socio-economic groups with the next largest incremental change observed between the average and disadvantaged groups. In 2001, while the largest incremental change in odds ratio was observed between the extreme advantaged and advantaged socio-economic groups, the next largest incremental change was observed between the advantaged and average groups. Thus over time it appears that the association between odds of hospitalisation using PHI and socio-economic advantage changed from curvilinear to linear.

Changes in the adjusted incident rate ratio of hospitalisation using PHI versus Medicare

Box 4 shows the results of adjusting the crude incident rate ratios of hospitalisation using PHI

4 Adjusted incident rate ratio of hospitalisation using private health insurance versus hospitalisation using Medicare by locational accessibility and socio-economic status in 1991, 1996 and 2001

	1991		1996		2001	
	OR	IRR (95% CI)	OR	IRR 95% CI)	OR	IRR(95% CI)
Locational accessibility to services						
Highly accessible	1.739	0.31 (0.28–0.34)	2.180	0.22 (0.19–0.23)	2.356	0.36 (0.32–0.41)
Accessible	1.695	0.31 (0.28–0.34)	1.947	0.19 (0.17–0.20)	1.825	0.20 (0.18–0.23)
Moderately accessible	1.544	0.28 (0.25–0.31)	1.656	0.17 (0.14–0.17)	1.741	0.16 (0.14–0.18)
Remote	1.816	0.33 (0.29–0.37)	1.710	0.17 (0.14–0.18)	2.276	0.14 (0.12–0.15)
Very remote	1.000	0.18* (0.17–0.19)	1.000	0.10* (0.09–0.10)	1.000	0.09* (0.08–0.10)
Socio-economic status						
Extreme advantage	3.925	0.98 (0.92–1.01)	4.181	0.88 (0.82–0.90)	4.030	0.97 (0.91–0.99)
Advantaged	2.505	0.63 (0.59–0.64)	2.444	0.51 (0.48–0.52)	2.274	0.55 (0.51–0.56)
Average	2.168	0.54 (0.51–0.56)	2.002	0.42 (0.39–0.43)	1.802	0.43 (0.41–0.44)
Disadvantaged	1.561	0.39 (0.37–0.40)	1.462	0.31 (0.29–0.31)	1.501	0.36 (0.34–0.37)
Extreme disadvantage	1.000	0.25* (0.24–0.25)	1.000	0.21* (0.20–0.21)	1.000	0.24* (0.23–0.24)

OR = odds ratio (point estimate) for an episode of hospitalisation involving private health insurance relative to very remote/extreme disadvantaged group adjusted for gender, indigenous status, age, broad clinical category and either locational accessibility or socio-economic status. IRR = Calculated incident rate ratio of an episode of hospitalisation involving private health insurance versus the incident rate ratio of an episode of hospitalisation using Medicare (the public payment classification) adjusted for gender, indigenous status, age, broad clinical category and either locational accessibility or socio-economic status. *Crude incident rate ratio. ◆

versus Medicare for gender, indigenous status, age, broad clinical category and either locational accessibility or socio-economic status in all except the baseline groups. In all cases (locational accessibility and socio-economic status) the adjusted incident rate ratios reduced between 1991 and 1996. This was followed by an increase in the adjusted rate ratio in 2001 across all locational accessibility and socio-economic groups. The increase observed either surpassed the 1991 level (locational accessibility) or rose to be not significantly different from the 1991 level (socio-economic status) in the most accessible/highest socio-economically advantaged group. However, in all other groups the increase observed in 2001 fell short of the 1991 levels. In all groups, except the disadvantaged socio-economic group, the magnitude of the shortfall in the adjusted incident rate ratio was associated with worsening accessibility or socio-economic status.

The differential incident rate ratio across locational accessibility groups changed significantly over the 3 years of observation. In 1991, no statistically significant difference was observed in the incident rate ratio across the four accessibility groups (highly accessible to remote); in 1996 a significantly different incident rate ratio was observed between the upper and lower two accessibility groups; while in 2001 a statistically significant incident rate ratio was observed across all four accessibility groups. This indicates that differences in locational accessibility have become more influential over time.

The incident rate ratio across socio-economic groups remained relatively stable over the 3 years of observation, with a statistically significant difference between all four socio-economic groups (extreme advantage to disadvantaged) observed in all years. However, the difference in the incidence rate ratio between the extreme advantage and advantaged group, the two groups showing

the largest difference, was observed to increase over all 3 years.

Discussion

In this paper we have examined the changes in the rate of using PHI versus the public taxpayer-funded health insurance system (Medicare) for inpatient hospitalisation in individuals across socio-economic and accessibility groups at three key points in time. Health insurance systems (public or private) exist because there is a strong community desire to share the financial burden of poor health. In any community there are many who do not suffer socio-economic or other disadvantage. These individuals are able to contribute to their own needs, whereas others will be heavily dependent upon taxpayer-funded health care. A key ingredient of any stable health financing system is the careful management of the tendency of the better-off (non-disadvantaged) patients to drift towards taxpayer-funded health care.[18] In Australia, expansion of private alternatives has been the means used by the federal government to strike a social contract with non-disadvantaged better-off citizens to personally accept a larger share of the financial responsibility for their own health care in return for more freedom to choose who (choice of doctor), when, where (choice of hospital) and what (having some say in the procedure undertaken).[18] Such a social contract may result in a reduction in the pressure on publicly funded health services due to shifting participation towards private sector opportunities and away from the public (taxpayer-funded) system, which may then better cater to the needs of the poor and the disadvantaged.[19]

As expected, our results show that PHI use was strongly related to both socio-economic status and locational accessibility regardless of the year of observation. Between 1991 and 1996 the rates of PHI versus Medicare use fell sharply in all socio-economic and locational accessibility groups. This finding is consistent with the findings of others regarding the declining coverage of PHI over this time.[13,20,21] Our study also indicates that the magnitude of the decline in the rate of use of PHI within each group over this time was strongly inversely related to the degree of locational accessibility to services and, over the highest three socio-economic groups, inversely related to socio-economic status. Surprisingly the smallest reduction in the rate of PHI versus Medicare use was observed in groups having the lowest socio-economic status. From our study it appears that while uptake and associated use of PHI reduced across the board between 1991 and 1996 it was generally more significant in relatively disadvantaged groups compared with more advantaged groups. However, it also appears that the most severely socio-economically disadvantaged were least affected; on the face of it this appears to be a somewhat incongruent result. Studies using econometric analysis have suggested that affordability was, over this period, the dominant factor determining the extent of coverage of the population.[18] However, intermingled with the effects of affordability are the effects of health status and risk aversion. Generally, there is a tendency for a person's health status to influence their willingness to take out voluntary health cover, with those who are healthier less inclined and those who are sicker more inclined. It is widely recognised that individuals from lower socio-economic groups have, on average, poorer health status than individuals from higher socio-economic groups.[3] It may also be that sections of this group are more risk averse, perhaps due to the higher impact of any reduction in income in the event of an adverse health event. Together with their increased likelihood of ill health, this may make the utility offered by the peace of mind provided by PHI greater than the disutility offered by income reduction due to the purchase of PHI. This may at least partially explain our observation that the most severely socio-economically disadvantaged showed the least reduction in rate of PHI versus Medicare use.

With regard to the changes in the rate of PHI versus Medicare use in response to the federal government's PHI reform policies, our study indicates that these policies appear to have had a positive impact on the rate of PHI use. In all groups the adjusted incidence rate ratio of PHI

versus Medicare use increased between 1996 and 2001. In the least disadvantaged groups (either by locational accessibility or socio-economic status) the increase in rate observed brought the rate of PHI use back in line with the rate observed in 1991. However, in all other groups the rates observed in 2001 were significantly lower than in 1996. The magnitude of the differences observed in each group between 1991 and 2001 had the same distribution as for the magnitude of the differences observed in each group between 1991 and 1996. Thus it is highly likely that similar factors came into play. This observation lends evidence to the suggestion that the policies enacted over this time have, in real terms, increased the affordability of PHI.

We found that a larger gradient in the rate of PHI versus Medicare use exists for degree of socio-economic status compared with that for the degree of locational accessibility to services. These findings are congruent with the theory that affordability, or, more correctly, utility which incorporates the element of affordability and its interaction with other factors, is the major driving force in the uptake of PHI since socio-economic status can be seen as a pseudo-measure of levels of disposable income. The use of the "utility" explanation has some empirical basis in other studies, as the decline in coverage in the mid 1990's and the rebound in coverage observed following the 30% rebate were both found to be stronger than predicted using affordability alone.[18] In addition, we found that the differential incident rate ratio across disadvantaged groups increased over time (1991 to 2001), indicating greater divisions between the strata. This could be another indication that affordability per se is not the sole agent responsible for PHI uptake, but rather, a more complex agent, conceptualised by utility which incorporates an element of affordability, is the main driver. A change in utility over time would account for the differential changes observed across disadvantaged groups since the degree of influence of the affordability component would vary.

The PHI incentive scheme and 30% rebate on one hand, and the Medicare levy surcharge and Lifetime Health Cover on the other,[21] were designed to provide financial incentives or penalties so as to influence purchase and retention of PHI. Such financially based incentives or penalties appear to have relatively more influence on the behaviour of those who are socio-economically advantaged. This may occur because the choice to purchase PHI conforms to the theory of expected utility, where the decision follows from a trade-off between the uncertain utility of a higher quality of or access to health care and the disutility of income reduction from the payment of insurance premiums.[19] Because disposable income is an individual utility determinant, the greater the disposable income the more likely an individual is to purchase PHI. Thus the poor are less likely to purchase PHI compared with the rich.

Significant factual error in our results is highly unlikely as the data used were population based and classification regimes were applied consistently throughout the dataset. Exhaustive validation research on the WA Data Linkage System[14] has shown that missing demographic data items are very uncommon (<1%). There are, however, some potential sources of error in interpretation. One of the possible sources of interpretative error is the use of 2001 as the time point for evaluation of the impact of the federal health care policy reforms. This time point was chosen for two reasons: firstly, when the study was undertaken hospital morbidity data were not available for all of 2002; and secondly, the population denominators used to calculate the crude incidence rate ratios were more reliable since 2001 was a census year. We recognise that this time point has the potential to be too early to fully evaluate the impact of Lifetime Health Cover, the policy being only introduced in July 2000; however, we feel that the data are able to give an indication of the immediate impact of the policy. To test this we repeated the analysis using hospital morbidity data system data from 2000 and census data from 2001. The analysis indicated (results not shown) that that the incidence of hospitalisation using PHI increased in 2001, compared with 2000, suggesting that while we may not have fully

captured the effect of Lifetime Health Cover, the immediate effects have been captured by our analysis.

In summary, our study indicates that the recent federal government policies which were aimed at making PHI more affordable to, and, therefore more widely used by, lower to middle income earners were successful, lending empirical evidence in support of price, or more accurately utility, elasticity of demand for PHI. Our results also indicate that the magnitude of their success varied according to disadvantage suggesting that the elasticity is variable across both the level and typology of disadvantage.

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Competing interests

Professor D'Arcy Holman is a director of HBF Health Funds Inc.

This study was undertaken as part of a collaborative research and development venture funded by HBF Health Funds Inc. and the Western Australian Department of Health. HBF Health Funds Inc. was not directly involved in study design, data collection or analysis of the data. Their opinion was sought during the interpretation phase, mainly with regard to background information on changes in local service provision. In addition, prior to publication a draft of the manuscript was submitted to HBF Health Funds Inc. and their comments sought. These were addressed by the authors and the manuscript revised where appropriate.

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