EARLY EFFECTS OF POVERTY REDUCTION STRATEGIES ON HEALTH SPENDING AND SERVICE DELIVERY

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ABSTRACT

Poverty Reduction Strategy Papers (PRSPs) are a national planning framework promoted by the World Bank and International Monetary Fund for alleviating poverty. This analysis uses secondary panel data from 1998 to 2004 to consider the effect of PRSPs on national health spending, the proportion of public versus private spending on health, and service delivery in the form of vaccination coverage. Forty-two of the 64 low-income countries in the analytic sample implemented a PRSP during the study period. Models controlled for country-level fixed effects as well as economic and demographic factors. Results show that the presence of PRSPs led to a statistically significant increase in health spending on the order of one-third to one-half of a percentage point of GDP ($p < .005$), depending on model specification. No conclusive evidence was found of significant changes in the proportion of public spending in response to PRSP adoption, and vaccination rates increased significantly only after using debt relief status as an instrument. Total national health expenditures increased after PRSP adoption, but the mechanism through which this rise occurred is unclear. Moreover, the stagnation of public spending raises questions about the impact of the program on the poor and poverty alleviation.

Key Words: poverty reduction strategy paper, national health expenditures, vaccination
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INTRODUCTION

In the 1980s and early 1990s, the World Bank and International Monetary Fund (IMF) compelled any country seeking their financial assistance to institute a series of macroeconomic reforms designed to stimulate long-run economic growth. Structural adjustment, as this conditionality came to be known, was widely perceived to cause severe stress on the social sectors of implementing countries (Weil *et al*., 1990; Sahn and Bernier, 1995). Consequently, the approach proved politically untenable, raising the ire of political activists and policymakers in several countries. In response to criticism, the World Bank (or the Bank) and the IMF distanced themselves from structural adjustment and announced in 1999 a new framework for economic development in low-income countries: the Poverty Reduction Strategy (PRS) Initiative (Bond and Dor, 2003). The PRS Initiative aims to push poor countries toward faster, sustainable growth and a sizeable reduction in poverty by asking low-income nations to articulate a plan for poverty relief in a Poverty Reduction Strategy Paper (PRSP) (Claeson *et al*., 2001). More than five years into this economic "experiment", this study tries to determine if the PRS Initiative led to an increase in the health resources devoted to countering poverty.

The Poverty Reduction Strategy Initiative

Poverty Reduction Strategy Papers are national planning frameworks in which low-income countries use multi-sectoral strategies to target activities for the poorest segments of society (Claeson *et al*. 2001). Of the 51 countries that approved a PRSP by January 2007, about half (24) are located in sub-Saharan Africa (Table 1). The remaining countries are sprinkled throughout Asia, Latin America, and Eastern Europe.

Countries have two key motives for adopting a PRSP (World Health Organization, 2004). First, concessional lending from the Bank and IMF is tied to the development and implementation of a PRSP. These loans include the IMF's Poverty Reduction Growth Facility (PRGF) and the World Bank's Poverty Reduction Support Credit (PRSC). In total, more than 80 countries may eventually complete a strategy document to receive continued concessional lending from the Bank and IMF (World Bank Operations Evaluation Department, 2004). Second, a country qualifies for debt relief under the Highly Indebted Poor Country (HIPC) Initiative only after it writes a PRSP and "satisfactorily" implements the activities described therein for at least a year (World Bank Independent Evaluation Group, 2006). The Bank and IMF intend for the PRS Initiative to free up and re-allocate resources from debt servicing toward poverty-reducing programs in the 38 countries qualifying for the HIPC initiative. (Twenty-three countries not qualifying for the HIPC Initiative have developed a PRSP as well.)

Country ownership of each proposed plan is a guiding principle of the PRS Initiative and one of the biggest rhetorical shifts for the Bank and IMF. Although critics question the extent to which countries control the process of PRSP development (Bond and Dor, 2003; Center for Global Development, 2007; World Health Organization, 2001), each country has

some latitude to select its own priorities and formulate a strategy for addressing these priorities. The resulting documents vary widely across countries in content, quality, and depth. The financial incentives afforded countries that adopt a PRSP has led some, in particular the early adopters, to focus more on completing the documents than on implementation of the strategy and on improving domestic processes (World Bank Operations Evaluation Department, 2004).

PRSP Funding and Country Spending

The IMF and World Bank encourage the composition of public expenditures under the PRSPs to shift toward the social sectors, including health and education (Devarajan and Go, 2002). A major finding of the Bank's formative evaluation of the PRS Initiative was that the strategy documents do indeed steer a larger number of dollars toward expenditure plans for social programs (World Bank Operations Evaluation Department, 2004). A recent report by the Center for Global Development confirms a moderate rise in per-capita health spending since the late 1990s in poor countries (Center for Global Development, 2007).

The multilateral institutions (the Bank and IMF) have the capacity to boost public expenditures through financial assistance to governments. The Bank created a new line of credit, called the Poverty Reduction Support Credit (PRSC), specifically to support policy reform laid out in the PRSPs. The loans, structured as general budget support, provide more flexibility and a longer time frame than standard lending practices (World Bank Operations Evaluation Department, 2004). Overall lending from the Bank's International Development Association (IDA) to PRSP countries jumped during the 2000 to 2003 period compared to the preceding three years, both in absolute terms and relative to non-PRSP countries (World Bank Operations Evaluation Department, 2004). In contrast, although PRSPs allocated 43 percent of resources to social sector expenditures, the IDA budgeted only 25 percent of its assistance toward the social sector of countries that implemented a PRSP. In other words, the Bank did not appear to harmonize its support with the needs specified in the PRSPs. The Bank has not publicly accounted for this differential.

A review of 23 interim PRSPs found that, while all addressed public health expenditures, considerable variability exists in the level of detail provided in each document (Laterveer *et al*., 2003). Almost three-quarters of the documents addressed the distribution of public health expenditures to some degree. Of the 23 documents, five indicated the intention of providing more detailed information in the full PRSP. One paper failed to address the issue of distribution in spending at all. None of the documents specifically mentioned quantitative or qualitative studies of current distribution patterns.

A joint analysis by the World Bank and IMF reported several key trends in health spending for countries with PRSPs, based on national authorities and IMF estimates. On average, the study's 14 countries with PRSPs increased "poverty-reducing" outlays in relation to gross domestic product (GDP) (1.4 percent) and total spending (3.9 percentage points) during the period between 1999 and 2001 (IMF and World Bank, 2003). These expenditures include health, education, and infrastructure outlays, although budget systems did not allow for

disaggregation of the data by sector (e.g., health). The joint analysis provides supporting evidence for an increase in health spending as a result of the PRS Initiative, but the paper failed to consider pre- and post-implementation changes to spending.

The World Health Organization (WHO) conducted a crude analysis of PRSPs in ten countries, which revealed wide variation in health spending as a percentage of government expenditures (World Health Organization, 2001). Seven of the 10 provided sufficient information to calculate planned changes in health spending over the PRSP period. Of these, six suggested that health spending as a percentage of government spending would increase. However, more information was needed to determine if the change in total government expenditure as a percentage of GDP would result in a real increase. In addition, it was not clear whether the spending increases were already planned in existing budgets. Uncertainty also exists in donor allocations and the ambitious rates of economic growth on which the projected increases are based. Thus, the WHO concluded that in 2001 it was too early to say if PRSPs would lead to additional money for the health sector (World Health Organization, 2001).

Research Questions and Hypotheses

This study addresses whether the PRSP has advanced the PRS Initiative's stated goal of increasing spending in the health sector. Specifically, three research questions are investigated using models that control for other relevant factors:

1) Did the adoption of Poverty Reduction Strategy Papers contribute to an increase in health expenditures over time?
2) Do PRSPs alter the balance in spending between the public and private sectors?
3) Do PRSPs lead to the provision of more health services over time?

Based on existing literature, PRSPs should cause a significant increase in health spending. PRSPs enable new ways for countries to attract donor support, including new lines of credit from the multilaterals. In addition, most PRSP adopters expect health spending to rise in subsequent years, according to the budgets studied by the WHO (World Health Organization, 2004).

The second research question pertaining to the distributional consequences of the PRS Initiative is more difficult to dissect. The IMF and World Bank promote both increased social spending and increased privatization in the PRS process, which likely have countervailing effects on access to health care, at least in the near term. Poorer individuals may rely more heavily on health services delivered through the public sector at a reduced rate, whereas richer individuals may be more likely to access the more expensive private sector. Thus, increased spending, if through the private sector, might be inconsistent with the pro-poor aims of the PRS Initiative.

Finally, most effects of the PRS Initiative on the delivery of health services and health outcomes are probably only able to be detected over a longer follow-up period than is available for this study. Vaccination coverage, however, is one important service that is highly sensitive to changes in the supply of health services. This study therefore

hypothesizes that rates of vaccination coverage may show improvement within a relatively short period of time following the implementation of a PRSP.

RESEARCH METHODS

Model

Myriad factors determine the level of national health spending in a developing country. Per-capita GDP has long been regarded as among the most important of these factors, and international comparisons have usually found a positive correlation between national income and national health spending (Hansen and King, 1996; Hitiris and Posnett, 1992; Kleiman, 1974; Newhouse, 1977). Higher incomes mean more tax revenues and more disposable income with which citizens can purchase health services. The health status of a population, often measured in life expectancy or mortality rate, also affects the level of health spending (Cremieux *et al*., 1999; Cremieux *et al*., 2005; Poullier *et al*., 2002).

Other variables related to national health expenditures include: external financial assistance (i.e., donor contributions), external debt, education level of the population, share of the population living in urban areas, and population density. Most developing countries rely on donor support to fund a portion of the health sector, and the amount of donor contributions relates to the level of health spending. Many developing countries have amassed large debts borrowed from other governments, multilaterals such as the Bank and IMF, and private lending institutions. Servicing these debts draws money away from domestic priorities, including health care delivery (Gupta *et al*., 2002). Increased educational attainment may be associated with increased knowledge and possibly increased utilization of available health services, both of which can lead to changes in health spending. Rural residents tend to have more limited access to health services, affecting consumption and spending patterns. Similarly, population density relates to the cost of providing services to citizens, and lower density may translate into the need for larger government outlays in order to serve the population (Cremieux *et al*., 1999; Cremieux *et al*., 2005). In addition, the change in population density over time is essentially an adjustment for population growth, which is indicative of the demand for health care.

The main equation below specifies the determinants of the dependent variable, national health spending ($SPENDING_{ct}$). The model controls for longitudinal trends and fixed effects at the country level c for each time t in order to account for unobserved, time-invariant factors:

$$SPENDING_{ct} = \alpha_1 PRSP_{ct} + X_{ct}\alpha + \delta_c + \tau_t + \mu_c^1 + \varepsilon_{ct}^1 \quad (1)$$

where $PRSP_{ct}$ is the explanatory variable of interest, X_{ct} is a vector of country- and year-specific economic and demographic indicators, δ_c is a vector of country-specific fixed effects, τ_t is a vector of year-specific fixed effects, μ_c^1 includes time-invariant unobserved factors, and ε_{ct}^1 is a random error term that varies by country and year. The economic and demographic factors include: gross domestic product (GDP) per capita, education measured

as a composite of adult literacy and school enrollment, official debt assistance (ODA) received per capita, total debt service, infant mortality rate, life expectancy at birth, proportion living in an urban area, and population density

The model exploits variation in the timing of PRSP adoption across countries to identify the effect of PRSPs. By controlling for time-invariant factors, the fixed effects method reduces the bias resulting from endogeneity—that is, the tendency of some countries to be more likely to implement a PRSP or, more specifically, a correlation between the program variable, the outcome variable, and unobserved, time-invariant factors. The coefficient estimates, however, still may be subject to bias resulting from time-varying unobservables.

From a modeling perspective, some countries adopt the PRSP at the end of a calendar year, implying that changes in health spending may not be detectable until the year following adoption or beyond. The lag in PRSP implementation is uncertain and heterogeneous across countries. In some cases, the effects of PRSP implementation may not occur until additional monies are allotted toward PRSP priority areas during a subsequent budget cycle. To test the program effect if a delay in the onset of effects exists, a dummy variable marking the year after PRSP adoption (and coded 1 for subsequent years) is tested in the multivariate analysis as well.

Specifications identical to Equation 1 are also used to gauge the impact of PRSPs on two other sets of dependent variables: (a) the proportion of health expenditures that occur in the public sector and (b) health service delivery as measured by three types of vaccination coverage. All models are estimated using ordinary least squares with country fixed effects.

Accounting for Endogeneity

As noted earlier, the decision to implement a PRSP may be inherently endogenous, and bias from unobserved, time-varying factors may remain. For example, the level of government corruption varies over time depending on the leaders in power, and corruption may affect the amount of spending on health as well as the likelihood that a government passes a PRSP to receive debt relief. A treatment-effects model—in which an instrumental variable both explains a potentially endogenous, categorical variable and is uncorrelated with the outcome and error term from the main equation of interest—can provide statistically unbiased, consistent estimation of coefficients and can control for unobserved heterogeneity (Heckman, 1976; Heckman, 1979). The treatment-effects model is analogous to estimation using two-stage least squares, an approach commonly used to control for endogeneity, except the treatment-effects model uses a probit estimator in the first stage instead of OLS.

For health spending and immunization coverage, one candidate for an instrument is country status in the HIPC debt relief initiative. The desire to gain debt cancellation is a key motivator for countries to adopt a PRSP. If a country reaches the so-called *completion point*, earning full debt relief from the IMF and World Bank, one expects health spending to increase in response to savings from debt servicing (Gupta *et al*., 2002).

The first stage of the treatment-effects model describes the potentially endogenous variable found in Equation (1), run using a probit estimator:

$$PRSP_{ct} = \phi(HIPC_{ct}, REGION_{ct}, X_{ct}, \tau, \tau^2) \quad (2)$$

where $HIPC_{ct}$ is debt relief status, X_{ct} is a vector of factors used in Equation (1), τ is a linear time trend variable (e.g., 1 = 1998, 2 = 1999), which along with τ^2 provides a flexible adjustment for time trends. The categorical variable for debt relief status $HIPC_{ct}$, modeled as a dummy variable for each category, divides countries as follows: 1) ineligible for debt relief, 2) eligible for debt relief, but the country has yet to reach the intermediate *decision point* in the debt relief process, which qualifies the country for interim relief, and 3) eligible for debt relief and the country has reached the decision point or beyond. $REGION_{ct}$ is a linear combination of the country dummies from the main Equation (1). In Equation (2), the fixed effects are a perfect predictor of $PRSP_{ct}$ for the controls, those countries that never adopted a PRSP.

Although many countries made progress toward achieving debt relief from 1998 to 2004, only six reached the completion point before 2003 and nine before 2004, meaning that most countries did not have much time to benefit directly from debt relief during the study period. Therefore, in the short term (i.e., during the study period), progress towards debt relief may not be a good predictor of changes in health spending and, therefore, $HIPC_{ct}$ may be a viable instrument for PRSP adoption. A further hazard of the chosen instrument is that debt relief status may be endogenous to estimating PRSP adoption in the first stage of the treatment-effects approach. In order to reach the decision point, a country needs to develop a PRSP (World Bank Independent Evaluation Group, 2006). Also, while ideally at least one additional instrumental variable would be identified to allow a test of HIPC as an instrumental variable, no other instrumental variables were available and the treatment effects model is exactly identified.

A variant of the Hausman test was employed to test for the presence of endogeneity in the program variable, PRSP adoption (Kennedy, 2004). The variable for total health expenditures was regressed on the covariates from Equation (1), including $PRSP_{ct}$, along with the predicted value of $PRSP_{ct}$ from Equation (2). The predicted value lacks explanatory power of health spending, leading to a failure to reject the null hypothesis that OLS is a consistent estimator ($F = .01$, $p = .94$), suggesting that PRSP implementation is exogenous. Despite the significance of the result, we present estimates with the instrument alongside OLS estimates of Equation (1). The Hausman test assumes the instrument is valid, which cannot be confirmed with exact identification (only one instrument).

An F test was used to test the strength of the instrument in the first stage ($\chi^2 = 45.4$, $p<.001$). The large test statistic value supports the strength of the instrument. Instrumental variables operate best when the model fit for the auxiliary first stage is high; in this case, the regression model explains 60 percent of the variation in PRSP adoption (pseudo-R^2 = .60). Given exact identification, there is no way to test for exclusion of the instrument from

the equation of interest. As described above, it is plausible that debt relief status has no bearing on health spending over the short time horizon covered in this study.

According to a Hausman test, the program variable was exogenous to government health spending ($p = .41$). In contrast, an exogeneity test for each of the vaccination types yielded test statistics that were significant at the .05 level, indicating that PRSP adoption is endogenous to vaccination coverage. Again, this result rests on the untestable assumption that the instrument is valid.

Two other covariates, infant mortality rate and life expectancy at birth, also have potential endogeneity. The multivariate analyses were run with and without these variables to see if their presence alters the effect of the other coefficients on health spending and vaccination coverage.

Data

This secondary analysis relies on annual panel data from several sources. The panel data available for analysis provide several advantages over simple cross-sectional data (Wooldridge, 2005). Panel data can better control for unobserved heterogeneity arising from omitted time-invariant variables, such as the level of egalitarianism in society or the prevailing attitude towards government involvement in the social sector. Panel data also may enable the identification and measurement of effects that are simply not detectable in pure cross-sections. From a statistical viewpoint, panel data are more informative and generally have more variability, less collinearity, and greater efficiency than cross-sectional data.

The subsections below review the sources and form of the dependent and independent variables used in the analysis, as well as the sample composition.

Dependent and Independent Variables

Data on health spending come from the National Health Accounts (NHA). The NHA, which establishes standard, detailed definitions and processes, traces the annual flow of funds through the health system for the express purpose of using data to make informed policy decisions (World Health Organization, 2003). Production of the NHA at the country level requires collection of existing data from ministries, donors, households, providers, and industry groups (Partners for Health Reform Plus, 2003). The effort typically involves primary data collection to supplement available information. Annual expenditure data are publicly available by country from 1998 to 2005, although many data points have been interpolated or even extrapolated from existing NHA estimates. The spending estimates are likely to improve over time (Musgrove *et al*., 2002), and the WHO updates current and previous estimates on an annual basis. Thus, no systemic bias related to improved data capability should account for observed trends over time. Disaggregated health spending data are available for public, private, donor, and out-of-pocket funds. Two dependent variables are studied here: total national health spending relative to GDP and the proportion

of health funds from the public sector. Levels of health spending are based on amounts in US dollars.

The WHO warns that NHA spending estimates from 13 countries are derived from limited data sources and should be interpreted with caution (World Health Organization, 2006). Of the 13 countries, only Mauritania is included in the analytic sample. Country figures are computed by the WHO to assure comparability and are based on NHA reports, surveys, the National Accounts series, accessed information and/or country consultations.

The third model examines vaccination coverage rates across countries, using data from the World Health Organization and United Nations Children's Fund (UNICEF). Estimates are based on data officially reported to the WHO and UNICEF by member states as well as other data gathered by WHO and UNICEF (World Health Organization and United Nations Children's Fund, 2006). Eight measures of vaccine coverage are included in the data set, although most are missing a non-trivial number of observations. This analysis focuses on the three types of vaccine that have the most complete country-year data: a third dose of diphtheria toxoid, tetanus toxoid and pertussis vaccine (DTP); a third dose of polio vaccine; and injection of measles-containing vaccine.

Independent variables are described in Table 2.

Sample Composition

The initial sample includes 149 countries identified as less economically developed. Data on health spending were available for all countries through the World Health Organization. A full complement of covariates was available for at least one year in 131 of the 149 countries (88 percent). Many observations were dropped as a result of missing data on debt servicing. These omitted observations (and omitted developing countries) tend to derive from small island nations (e.g., Kiribati, Micronesia, Palau), war-torn countries (e.g., Liberia, Somalia) or countries in economic turmoil (e.g., North Korea). None of the countries dropped has adopted a PRSP. Thus, their omission from the analysis may improve the validity of the results by increasing comparability between the treatment and control groups.

The final analytic sample includes all countries that could be expected to develop a PRSP at some point. Paring the universe of countries to this subset adjusts for sample selection bias in which only poor countries would be expected to adopt a PRSP, because only they are eligible to receive financial incentives for implementing a PRSP. The major incentives for implementing a PRSP are debt relief and additional lending. The latter is more inclusive, so it is used as the selection criterion for the analytic sample. Specifically, the final analytic sample includes all countries for which data were available and that were defined by the IMF as eligible for concessional lending under the Poverty Reduction & Growth Facility (PRGF) loan program. The PRGF includes all countries that had a gross national income below US$ 895 per capita in 2003, as well as selected small island nations. In other words, the final study sample is limited to countries with national income below a certain

threshold. Forty-two of the 64 low-income countries in the analytic sample implemented a PRSP by 2005.

RESULTS

Descriptive Analysis

Table 3 presents the means at baseline of the country characteristics included in the analysis. Characteristics of the combined low- and middle-income sample (the initial sample) in Column 1 differ substantially from the low-income countries (the final analytic sample) in Column 2. Compared to the analytic sample, countries from the wealthier initial sample spend more on health, use fewer public dollars to do so, and vaccinate more children. Among low-income countries, PRSP adopters (Column 3) are statistically similar at baseline to countries that have never adopted a PRSP (Column 4) for all outcomes and explanatory characteristics, based on *t* tests of the difference of means with unequal variances.

A bivariate look at PRSP adoption shows that countries that ever adopted a PRSP experienced greater growth in total health spending from 1998 to 2005 than both low- and middle-income countries that never adopted a PRSP (Figure 1). By 2005, health spending for adopters had closed to within nearly a third of a percentage point of middle-income non-adopters. Moreover, among PRSP adopters, national health spending increased markedly in the years immediately following adoption (data not shown). From 1998 to 2005, public health expenditures increased equally among PRSP adopters and comparison countries of low income (Figure 2), implying that adoption status may not differentially affect public spending. Coverage rates for the DTP, measles, and polio vaccines rose for PRSP adopters and non-adopters alike during the study period (Figure 3). Among poor countries, the patterns for the treatment and control groups mirror each other, such that the size of the gap in 1998 is the same as in 2005.

Multivariate Analysis

Health Spending

Table 4 shows the relationship between a series of explanatory factors related to total health expenditures (THE) as a percentage of GDP. All estimation models include 415 observations from 64 countries, 42 of which implemented a PRSP at some point during the study period from 1998 to 2004. Model 1 contains the coefficient estimates from an OLS regression using country-level and year-level fixed effects. The adoption of a PRSP is associated with a .36 percentage point increase in the proportion of GDP allocated to national health spending (e.g., from 5.00 percent of GDP to 5.36 percent of GDP) (p = .004). Per-capita GDP is also related to THE. A $1000 increase in GDP per capita counterintuitively leads to a 1.19 percentage point drop in THE as a proportion of GDP (p = .002). Perhaps lower-income countries receive more donor funding than their richer

counterparts, accounting for more health spending as GDP declines. None of the other covariates in the model is associated with a statistically significant change in THE. These results are robust to use of a model that allows for a delayed effect of PRSP adoption (i.e., PRSP adoption plus a year) in Model 2, and the magnitude of the program variable increases to nearly a half-percentage point increase in the outcome ($p = .001$). The results in Model 1 do not change if life expectancy and infant mortality, two potentially endogenous variables, are omitted from the model (results not shown).

The treatment-effects approach in Models 3 and 4 controls for the endogeneity in PRSP implementation, using HIPC debt relief status as an instrumental variable. The coefficient estimate of PRSP adoption drops slightly to .315 with use of the instrument as compared to Model 1, but more importantly, the coefficient is no longer statistically significant ($p = .138$). The inverse relationship between per-capita GDP and THE holds even when controlling for endogeneity ($p = .001$). Adjustment for debt relief status leads to a slightly increased, statistically significant coefficient estimate for the delayed effect for PRSP adoption in Model 4 ($p = .022$).

According to the results in Table 5, PRSP adoption does not contribute to a change in the proportion of health spending that is publicly funded (Model 1, $p = .777$). The treatment-effects model, again with HIPC eligibility as the instrument, does not alter this relationship (Model 2, $p = .761$). Although public spending changed slightly for the bivariate analysis presented in Figure 2, the result is insignificant after controlling for explanatory factors related to public health spending. Except for GDP, which is positively related to the proportion of health spending that is publicly funded, none of the other variables is statistically significant. The lack of effect of PRSP could, however, be due to insufficient power due to small sample size.

Vaccination Coverage

The results for three vaccine types—DTP, measles, and polio—are provided in Table 6 for fixed effects and treatment-effects estimation. In each case, vaccination coverage is not affected by PRSP adoption using fixed effects (Models 1, 3, 5), but the coefficient estimates turn significantly positive when eligibility for HIPC debt relief is used as an instrumental variable to explain PRSP adoption. A delayed effect in PRSP adoption provided a similar pattern (results not shown). According to the treatment-effects models, which adjust for country-level fixed effects, vaccination rates increased after PRSP adoption by 8.6-percentage points for the DTP vaccine, by 6.6-percentage points for the measles vaccine, and by 6.7-percentage points for the polio vaccine.

CONCLUSIONS

Although the magnitude and significance of effects of PRSP varied with model specification (immediate effect versus delayed effect), the analyses indicate that the Poverty Reduction Strategies potentially have a measurable effect on national health spending. An

"average" country that adopts a PRSP—i.e., with characteristics similar on average to other PRSP adopters—can expect a spending increase in the range of one-third to one-half a percentage point of GDP. However, the proportion of health spending coming from the public coffers does not change significantly, however, as a result of PRSP adoption.

The results from vaccination coverage are more difficult to interpret. Without instrumenting for debt relief status, PRSPs did not increase vaccination rates. Statistical tests suggest that PRSPs are endogenous with respect to vaccination coverage, though tests of the validity of the instrument were not possible due to exact identification. The IV (treatment effect) estimation led to a huge increase in the magnitude and significance of the coefficient estimates, on the order of a 6- to 9-percentage point increase in coverage.

Is an increase in total health spending on the order of one-third to one-half percentage points of GDP a large increase or a small increase? If most countries averaged health spending of 4 to 6 percent of GDP from 1998 to 2005, then the effect of PRSPs equates to a spending rise of about 5 to 12 percent (not percentage points). An argument can be made that the low-income countries started with a puny baseline level of spending, and a 5-percent increase of a modest amount is still a modest amount. However, by objective standards, assuming these results are accurate, the PRSP must be considered at least a modest success for making progress over a short time period toward its objective of raising the level of spending in the social sector.

Given that health spending rose over time, the mechanism through which this occured is unclear. Several pathways are possible. Countries may have implemented their Poverty Reduction Strategies as planned and, thus, allocated greater funds to the health sector. Monies saved as a result of debt relief may have found their way into social sector spending, especially if the country had genuine interest in poverty alleviation. Similarly, the implementing country may have had more disposal funds on hand, thanks to increased lending from the IMF and World Bank. Alternatively, the PRSPs may have galvanized donors to support country activities, either through general budget support or targeted health-sector donations. This analysis cannot answer the question of why spending increased, although the authors speculate that a confluence of the above-named factors resulted in the spending patterns over time.

How are countries spending the extra health-sector dollars? Both the bivariate and multivariate analyses detected no change in spending patterns across the public and private sectors as a result of the PRSP. The Poverty Reduction Strategy, as conceived by the World Bank and IMF, prioritize interventions targeted to the poor. The finding that more money is not being funneled through the public sector should raise concerns about the implications of the program for the poor. More research is needed to understand the impact of the PRS program on poorer segments of society.

Even without a greater allocation of additional health funds to the public sector, does the boost in spending translate into a change in service delivery or health outcomes? The literature indicates that health spending can determine health outcomes within a country

and in international comparisons (Cremieux *et al*., 1999; Cremieux *et al*., 2005). Initial estimates of the effect of PRSPs on service delivery in the form of vaccination rates found that the program has produced tangible gains, though the results rely on the validity of the instrument, which cannot be tested.

Limitations

Several factors limited the study design and analysis. The date of PRSP approval is most likely endogenous to health spending if countries in greater need are more likely to adopt a PRSP earlier in order to receive financial assistance. Although the exogeneity test pointed to lack of an endogeneity problem for total health expenditures, the specification of the first stage of the treatment-effects model using a pooled probit calls into question this finding. A better instrument could better control for omitted variable bias.

Data quality is a major limitation of the study. The data collection and reporting systems in many low-income countries are of poor quality. Data collection for both health spending and immunization rates are based on surveys with highly varied methodology across countries and, in some cases, with different designs within a country from one year to the next. However, measurement error in the dependent variable, if random, is subsumed by the error term. The quality of the health spending data is particularly dubious. The National Health Accounts have strict guidelines for estimating financial flows; even still, standard estimates are not possible.

Sample size is another concern. The small number of countries in the control group may limit the representativeness of this study arm. The short study period is a confounder with a similar effect. A longer post-implementation period could produce a more efficient and more reliable program impact. In particular, increased health outlays may not result in immediate changes to vaccination coverage. A more comprehensive study could examine other measures of improvement in health service provision as well.

Policy Implications

Health sector planning can determine the allocation of health inputs and the services available to individuals within a country, thereby affecting the average health status across a population. The Poverty Reduction Strategy Papers aim to improve the ongoing planning in developing countries. Success will result in diminishing poverty levels. Failure will result in national governments dependent on donors, international organizations, and non-governmental organizations to perform the basic functions that the governments could not perform for themselves. Regardless of whether sovereign nations or the IMF and World Bank are orchestrating the design and implementation of PRSPs, much is at stake.

Many developing countries will continue to formulate a PRSP over the next five years. Others will modify the original documents based on evolving local conditions and expectations. Without a knowledge base of which strategies work, policymakers will

prosecute decisions based on political pressures alone. The burden falls on researchers to fill the information gap of the effects of PRSPs.

As the oldest Poverty Reduction Strategies reach their seventh birthday in 2007, researchers have an opportunity to inform the future decisions of low-income nations. This study contributes to the literature on PRSPs. The results offer a first look at the effect of PRSPs on the health sector in less economically developed countries. PRSPs are leading to changes in the priorities and flows of money in the health sector. It is important to highlight that, while health spending levels increased modestly from 1998 to 2004, these levels are still below those estimated to be required for broad delivery of a basic package of health services (Center for Global Development, 2007). Decision makers and researchers should discuss what this means for health in low-income countries and how the PRS process can be leveraged to improve health outcomes. The health of many nations may benefit from thoughtful planning, creative approaches, and effective implementation of these strategies.

REFERENCES

Bond P, Dor G. 2003. Uneven health outcomes and political resistance under residual neoliberalism in Africa. *International Journal of Health Services : Planning, Administration, Evaluation,* **33**(3), 607-630.

Center for Global Development. 2007. Does the IMF constrain health spending in poor countries? Evidence and agenda for action. Report from the Working Group on IMF Programs and Health Spending. Washington, DC: Center for Global Development.

Claeson M, Griffin CC, Johnston TA, McLachlan M, Soucat ALB, Wagstaff A, et al. 2001. Poverty-reduction and the health sector. In Alexander Preker (Ed.), *Poverty Reduction Strategy sourcebook.* Washington, DC: The World Bank Group.

Cremieux P, Meilleur M, Ouellette P, Petit P, Zelder M, Potvin K. 2005. Public and private pharmaceutical spending as determinants of health outcomes in Canada. *Health Economics,* **14**(2), 107-117.

Cremieux P, Ouellette P, Pilon C. 1999. Health care spending as determinants of health outcomes. *Health Economics,* **8**(7), 627-639.

Devarajan, S, Go DS. 2002. *A macroeconomic framework for Poverty Reduction Strategy Papers (with an application to Zambia)*. Washington, DC: The World Bank Group.

Gupta S, Clements B, Guin-Siu MT, Leruth L. 2002. Debt relief and public health spending in heavily indebted poor countries. *Bulletin of the World Health Organization,* **80**(2), 151-157.

Hansen P, King A. 1996. The determinants of health care expenditure: A cointegrative approach. *Journal of Health Economics,* **15**(1), 127-137.

Heckman J. 1979. Sample selection bias as a specification error. *Econometrica,* **47**(1), 153-161.

Heckman J. 1976. The common structure of statistical models of truncation, sample selection, and limited dependent variables and a simple estimator for such models. *Annals of Economic and Social Measurement,* **5**, 475-492.

Hitiris T, Posnett J. 1992. The determinants and effects of health expenditure in developing countries. *Journal of Health Economics,* **11**, 173-181.

IMF and World Bank. 2003. *Poverty Reduction Strategy Papers--detailed analysis of progress in implementation*. Washington, DC: IMF and the World Bank Group.

Kennedy P. 2004. *A guide to econometrics* (5th ed.) Blackwell Publishers.

Kleiman E. 1974. The determinants of national outlay on health. In M. Perlman (Ed.), *The economics of health and medical care* (pp. 66-81). London: MacMillan.

Laterveer L, Niessen LW, Yazbeck AS. 2003. Pro-poor health policies in poverty reduction strategies. *Health Policy and Planning,* **18**(2), 138-145.

Musgrove P, Zeramdini R, Carrin G. 2002. Basic patterns in national health expenditure. *Bulletin of the World Health Organization,* **80**(2), 134-142.

Newhouse, J. P. (1977). Medical care expenditure: A cross-national survey. *Journal of Human Resources,* **12**(1), 115-125.

Partners for Health Reform Plus (PHRplus). 2003. *Understanding national health accounts: The methodology and implementation process.* PHRplus.

Poullier J, Hernandez P, Kawabata K, Savedoff WD. 2002. *Patterns of global health expenditures: Results for 191 countries* (Discussion Paper No. 51). Geneva: World Health Organization.

Sahn D, Bernier R. 1995. Have structural adjustments led to health sector reform in africa? *Health Policy (Amsterdam, Netherlands),* **32**(1-3), 193-214.

U. S. Census Bureau. 2006. *International Data Base.* Retrieved April 26, 2007 from http://www.census.gov/ipc/www/idbnew.html

United Nations Development Programme. 2005. *Human development report 2005: International cooperation at a crossroads*. New York, NY: UNDP.

United Nations Statistics Division. 2007. *National Accounts main aggregates database.* Retrieved April 25, 2007 from http://unstats.un.org.libproxy.lib.unc.edu/unsd/snaama/Introduction.asp

United Nations Statistics Division. 2006. *Demographic yearbook 2004*

Weil DEC, Alicbuscan AP, Wilson JF, Reich MR, Bradley DJ. 1990. *The impact of development policies on health*. Geneva, Switzerland: World Health Organization.

Wooldridge JM. 2005. *Introductory econometrics: A modern approach* (3rd ed.) South-Western College.

World Bank. *Poverty Reduction Strategies*. Retrieved April 25, 2007 from http://go.worldbank.org.libproxy.lib.unc.edu/FXXJK3VEW0

World Bank Independent Evaluation Group. 2006. *Debt relief for the poorest: An evaluation update of the HIPC initiative*. Washington, DC: The World Bank Group.

World Bank Operations Evaluation Department. 2004. *The Poverty Reduction Strategy Initiative: An independent evaluation of the World Bank's support through 2003*. Washington, DC: The World Bank Group.

World Health Organization. 2006. *Working together for health: The World Health Report 2006*. Geneva, Switzerland: WHO Press.

World Health Organization. 2004. *PRSPs: Their significance for health*. Second Synthesis Report). Geneva, Switzerland: WHO Document Production Services.

World Health Organization. 2003. *Guide to producing National Health Accounts with special applications for low- and middle-income countries*. Geneva, Switzerland: World Health Organization.

World Health Organization. 2001. *Health in PRSPs: WHO submission to World Bank/IMF review of PRSPs*. Geneva, Switzerland: Department of Health and Development.

World Health Organization and United Nations Children's Fund. 2006. *Immunization summary 2006: A statistical reference*

Table 1. Countries Adopting a PRSP, by Year

Country	Month of Implementation	Country	Month of Implementation
2000 (n = 4)		2003 (n = 10)	
Uganda*	March	Ghana*	February
Burkina Faso*	May	Azerbaijan*	April
Tanzania*	October	Cameroon*	April
Mauritania*	December	Nepal*	May
2001 (n = 5)		Chad*	June
Bolivia*	March	Georgia*	June
Mozambique*	April	Madagascar*	July
Nicaragua*	July	Mongolia*	July
Honduras*	August	Armenia*	November
Albania*	November	Pakistan*	December
2002 (n = 19)		2004 (n = 8)	
Guinea*	January	Serbia & Montenegro	February
Niger*	January	Bosnia & Herzegovina	March
Zambia*	March	Djibouti*	March
The Gambia*	April	Kenya*	March
Malawi*	April	Moldova*	May
Guyana*	May	Laos*	June
Mali*	May	Bhutan*	August
Senegal*	May	Cape Verde	September
Timor-Leste	May	2005 (n = 4)	
Vietnam*	May	Sierra Leone**	March
Yemen*	May	Lesotho**	July
Rwanda*	June	Bangladesh**	October
Tajikistan*	June	Nigeria**	December
Ethiopia*	July	2006 (n =1)	
Benin*	December	Dominica	April
Cambodia*	December		
Kyrgyz Republic*	December		
Sao Tome & Principe*	December		
Sri Lanka*	December		

* Country included in treatment group of analytic sample (n = 42).
** Country included in control group of analytic sample (n = 4), because PRSP was implemented after 2004.

Table 2. Description of Independent Variables

Variable Name	Description
PRSP implementation	A dichotomous indicator of PRSP implementation, coded 0 for every year before the PRSP was adopted and 1 for the year of adoption and every year thereafter. Information on progress toward PRSP adoption and implementation is available on the World Bank's Web site (World Bank, 2007).
GDP per capita	GDP per capita is measured in US$ and divided by 1,000 for scaling purposes. Annual estimates of national per-capita GDP are assembled in the statistics database of the National Accounts, maintained by the United Nations (United Nations Statistics Division, 2007). The database contains a set of time-series data on aggregate national economic activity as reported by each country.
Education score	A composite measure created by UNDP for its annual Human Development Report. Constructed from the adult literacy rate and the combined gross enrollment ratio for primary, secondary, and tertiary schools, with 2/3 weight given to literacy and 1/3 weight to enrollment. Data on adult literacy are usually collected during national population censuses or from household surveys. Because definitions and data collection methods vary across countries, literacy estimates should be used with caution. Gross enrollment ratios are produced by UNESCO based on administrative data collected from national governments and population data. The ratios are calculated by dividing the number of students enrolled in all levels of schooling by the total population in the official age group corresponding to these levels.
Official development assistance (ODA) received per capita	This indicator represents the net disbursements that less economically developed countries receive in development aid from rich countries. ODA is measured in US$, divided by the country's total population to determine the per-capita value, and reported annually in the UNDP Human Development Report. The variable was scaled down by a factor of 1,000.
Total debt service	Total debt service is defined as the sum of principal repayments and interest actually paid in foreign currency, goods, or services on long-term debt, interest paid on short-term debt, and repayments to the IMF (United Nations Development Programme 2005). The variable is expressed as a percent of the value of goods and services exported and net income from abroad.
Infant mortality rate	The infant mortality rate is defined as the number of infants dying before reaching the age of one year per 1,000 live births. The variable is scaled to the death rate per 1,000,000 births. The data, compiled through a joint effort between the United Nations Children's Fund (UNICEF) and the WHO, are derived from regularly produced national estimates.
Life expectancy at birth	Estimates on life expectancy at birth are from the official UN population estimates and projections. They are prepared biannually by the Population Division of the United Nations Department of Economic and Social Affairs on the basis of data from national vital registration systems, population censuses, and surveys, and are reported annually in the UNDP Human Development Report.

Urban population	This variable is the percentage of areas of the total midyear population classified as urban according to the criteria used by each country, as reported to the United Nations
Population density	Population estimates, calculated as the total population divided by total surface area measured in square kilometers, are drawn from censuses and surveys (U. S. Census Bureau, 2006). The figures on surface area, comprising land area and inland waters, come from the UN Demographic Yearbook for 2004 data (United Nations Statistics Division, 2006). The denominator, surface area, only varies over time because of changes in estimation procedures and land transfers across countries.

Table 3. Means of Characteristics at Baseline (1998)

Variable Name	Source	Description	Initial Sample (n = 126)	Low-Income Countries		
				Total (n = 63)	PRSP (n = 45)	No PRSP (n = 18)
Dependent Variables						
Total health expenditures	[1]	% of GDP	5.40 (1.82)	5.01 (1.71)	5.16 (1.57)	4.62 (2.01)
Public health expenditures	[1]	% of total health expenditures	49.6 (19.6)	57.4 (20.2)	56.3 (18.3)	60.2 (24.8)
DTP vaccine coverage	[2]	% receiving vaccine	77.7 (21.5)	66.5 (23.1)	69.3 (23.3)	59.7 (21.7)
Measles vaccine coverage	[2]	% receiving vaccine	79.5 (19.4)	67.8 (20.2)	70.9 (19.5)	60.4 (20.6)
Polio vaccine coverage	[2]	% receiving vaccine	78.2 (21.0)	67.2 (23.0)	70.5 (23.0)	59.2 (21.6)
Independent Variables						
PRSP adoption	[3]	Year strategy approved	---	---	---	---
PRSP adoption + 1 year	[3]	Year after strategy approved	---	---	---	---
GDP per capita	[4]	US$, divided by 1,000	1.66 (1.80)	.422 (.235)	.423 (.236)	.420 (.239)
Education score	[5]	Composite index of adult literacy, school enrollment	.693 (.199)	.568 (.196)	.582 (.210)	.534 (.156)
ODA received per capita	[5]	US$, divided by 1,000	.043 (.056)	.040 (.034)	.042 (.035)	.036 (.031)
Total debt service	[5]	% exports of goods, services and net income from abroad, per 1,000	.015 (.011)	.015 (.009)	.015 (.008)	.016 (.013)
Infant mortality rate	[5]	Per million live births	.057 (.040)	.084 (.037)	.083 (.039)	.086 (.034)
Life expectancy	[5]	At birth	62.4 (10.6)	55.7 (10.0)	56.6 (10.4)	53.3 (8.6)
Urban	[5]	% of total population	46.1 (20.2)	33.7 (15.1)	34.8 (16.1)	30.9 (12.1)
Population density	[6], [7]	Midyear population divided by surface area (km^2)	100 (145)	87.8 (128)	90.8 (129)	80.3 (99.2)

Notes: Includes countries for which a full set of covariates were present for that country-year observation. Each cell contains a mean followed by a standard deviation in parentheses. PRSP countries include those that ever adopted. * Statistically significant difference at the 5% level between the sample means of PRSP countries and non-PRSP countries, using a two-tailed *t* test.

Source: [1] National Health Accounts; [2] World Health Organization/UNICEF data; [3] World Bank Web site; [4] National Accounts statistics database; [5] UNDP Human Development Reports; [6] US Census Bureau; [7] UN Demographic Yearbook.

Table 4. Multivariate analysis of total health spending in low-income countries

Model	1		2		3		4	
Model description	Fixed Effects OLS		Fixed Effects OLS Delayed Effect		Treatment Effects		Treatment Effects Delayed Effect	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
PRSP adoption	.363 **	.125			.315	.212		
PRSP adoption + 1 year			.456 ***	.131			.501 *	.219
GDP per capita	-1.19 **	.39	-1.12 **	.38	-1.19 ***	..35	-1.12 ***	.34
Education score	.169	.823	-.037	.817	.179	.741	-.038	.735
ODA received per capita	.551	1.99	.377	1.98	.567	1.79	.366	1.79
Total debt service	4.85	5.18	5.48	5.16	4.65	4.72	5.70	4.73
Infant mortality rate	.158	3.77	-.175	3.76	.189	3.40	-.166	3.38
Life expectancy	-.000	.001	-.000	.001	-.000	.007	-.000	.001
Urban (%)	-.001	.008	-.001	.008	-.002	.007	-.001	.007
Population density	.006	.006	.006	.006	.006	.006	.006	.005
Year dummies								
1998 (ref)								
1999	-.162	.119	-.161	.118	-.161	.107	-.162	.106
2000	-.216	.120	-.189	.119	-.214 *	.108	-.190	.107
2001	-.059	.128	-.027	.126	-.049	.122	-.028	.114
2002	-.064	.151	..043	.138	-.042	.158	.033	.131
2003	.101	.167	.124	.157	.131	.190	.103	.165
2004	.154	.187	.103	.187	.191	.218	.071	.211
Constant	4.85 ***	.85	4.95 ***	.84	7.43 ***	.94	7.48 ***	.94

Notes: Each model has 415 observations from 64 countries. * $p < .05$ ** $p < .01$ *** $p < .001$. HIPC debt relief status used as an instrument in Models 3 and 4.

Table 5. Analysis of government health spending in low-income countries

Model	1		2		3		4	
Model description	Fixed Effects		Fixed Effects Delayed Effect		Treatment Effects		Treatment Effects Delayed Effect	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
PRSP adoption	-.294	1.03			.506	1.77		
PRSP adoption + 1 year			-.406	1.10			2.01	1.84
GDP per capita	6.22	3.20	6.16	3.19	6.25 *	2.89	6.13 *	2.89
Education score	-6.54	6.83	-6.37	6.82	-6.70	6.16	-6.42	6.15
ODA received per capita	.122	16.5	.286	16.6	-.137	14.9	-.282	14.9
Total debt service	-1.75	43.0	-2.42	43.1	1.64	39.2	9.12	39.6
Infant mortality rate	-19.0	31.3	-18.8	31.3	-19.6	28.2	-18.3	28.2
Life expectancy	.011	.012	.011	.012	.011	.011	.012	.011
Urban (%)	.039	.064	.039	.064	.043	.058	.048	.058
Population density	-.005	.050	-.005	.050	-.001	.046	.005	.046
Year dummies								
1998 (ref)								
1999	-.014	.985	-.014	.985	-.027	.888	-.048	.896
2000	.789	.996	.768	.992	.758	.900	.727	.902
2001	1.55	1.06	1.53	1.05	1.37	1.01	1.45	.955
2002	2.33	1.25	2.25	1.15	1.97	1.31	1.69	1.10
2003	1.76	1.39	1.76	1.31	1.24	1.58	.649	1.38
2004	2.45	1.55	2.52	1.56	1.84	1.77	.842	1.77
Constant	43.6 ***	7.0	43.5 ***	7.00	32.7 ***	8.9	31.5 ***	8.93

Notes: Each model has 415 observations from 64 countries. * $p < .05$ ** $p < .01$ *** $p < .001$. HIPC debt relief status used as an instrument in Models 3 and 4.

Table 6. Multivariate analysis of vaccination rates

Model	1		2		3		4		5		6	
	DTP Vaccine				Measles Vaccine				Polio Vaccine			
Model description	Fixed Effects		Treatment Effects		Fixed Effects		Treatment Effects		Fixed Effects		Treatment Effects	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
PRSP adoption	.192	1.48	8.61***	2.53	.791	1.345	6.56**	2.37	.682	1.39	6.73**	2.44
GDP per capita	-6.84	4.35	-6.53	4.05	-.467	4.175	-.257	3.82	-8.38	4.30	-8.16*	3.94
Education score	-9.57	9.29	-11.2	8.58	-9.02	8.90	-10.1	8.13	-3.73	9.17	-4.88	8.37
ODA received per capita	31.1	22.5	28.5	20.5	8.83	21.58	7.06	19.5	17.6	22.2	15.7	20.1
Total debt service	-62.6	58.9	-25.8	55.6	-13.8	56.5	11.4	52.4	-75.8	58.1	-49.4	54.0
Infant mortality rate	-56.6	42.5	-62.2	38.3	-17.1	40.8	-20.9	36.7	-71.4	42.0	-75.4*	37.8
Life expectancy	.000	.016	.007	.015	-.001	.015	.003	.014	-.001	.016	.004	.015
Urban (%)	-.005	.087	.034	.080	-.043	.083	-.017	.076	.076	.086	.104	.079
Population density	-.103	.068	-.057	.066	.019	.066	.050	.062	-.010	.068	-.066	.064
Year dummies												
1998 (ref)												
1999	-.112	1.34	-.238	1.31	.173	1.289	.087	1.21	.111	1.33	.021	1.25
2000	2.62	1.36	2.31	1.32	.773	1.305	.562	1.22	1.54	1.34	1.32	1.26
2001	3.43*	1.45	1.56	1.46	1.75	1.39	.472	1.36	1.50	1.44	.162	1.40
2002	4.52**	1.71	.752	1.86	2.48**	1.64	-.104	1.75	3.78*	1.69	1.08	1.80
2003	9.86***	1.89	4.43*	2.23	5.73***	1.82	2.01	2.10	8.29***	1.87	4.40*	2.17
2004	12.3***	2.12	5.88*	2.61	7.48***	2.04	3.08	2.44	11.0***	2.1	6.40*	2.51
Constant	88.8***	9.54	114***	13	74.6***	9.15	91.9***	11.9	85.7***	9.4	112***	12.2

Notes: Each model has 414 observations from 64 countries. * $p < .05$ ** $p < .01$ *** $p < .001$. HIPC debt relief status used as an instrument in Models 2, 4, and 6.

Figure 1. Total Health Expenditures over Time, by PRSP Adoption Status

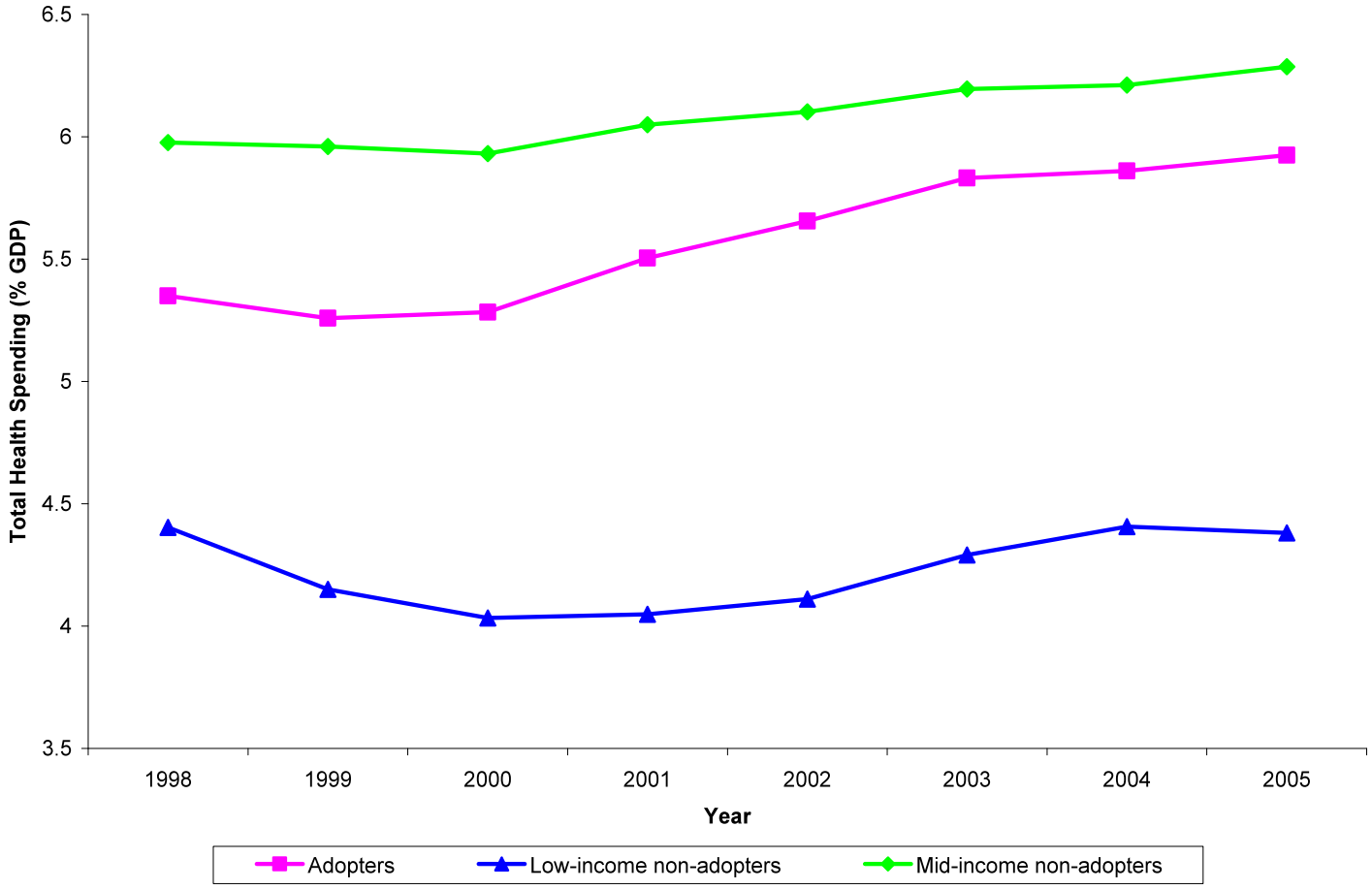

Figure 2. Public Health Expenditures over Time, by PRSP Adoption Status

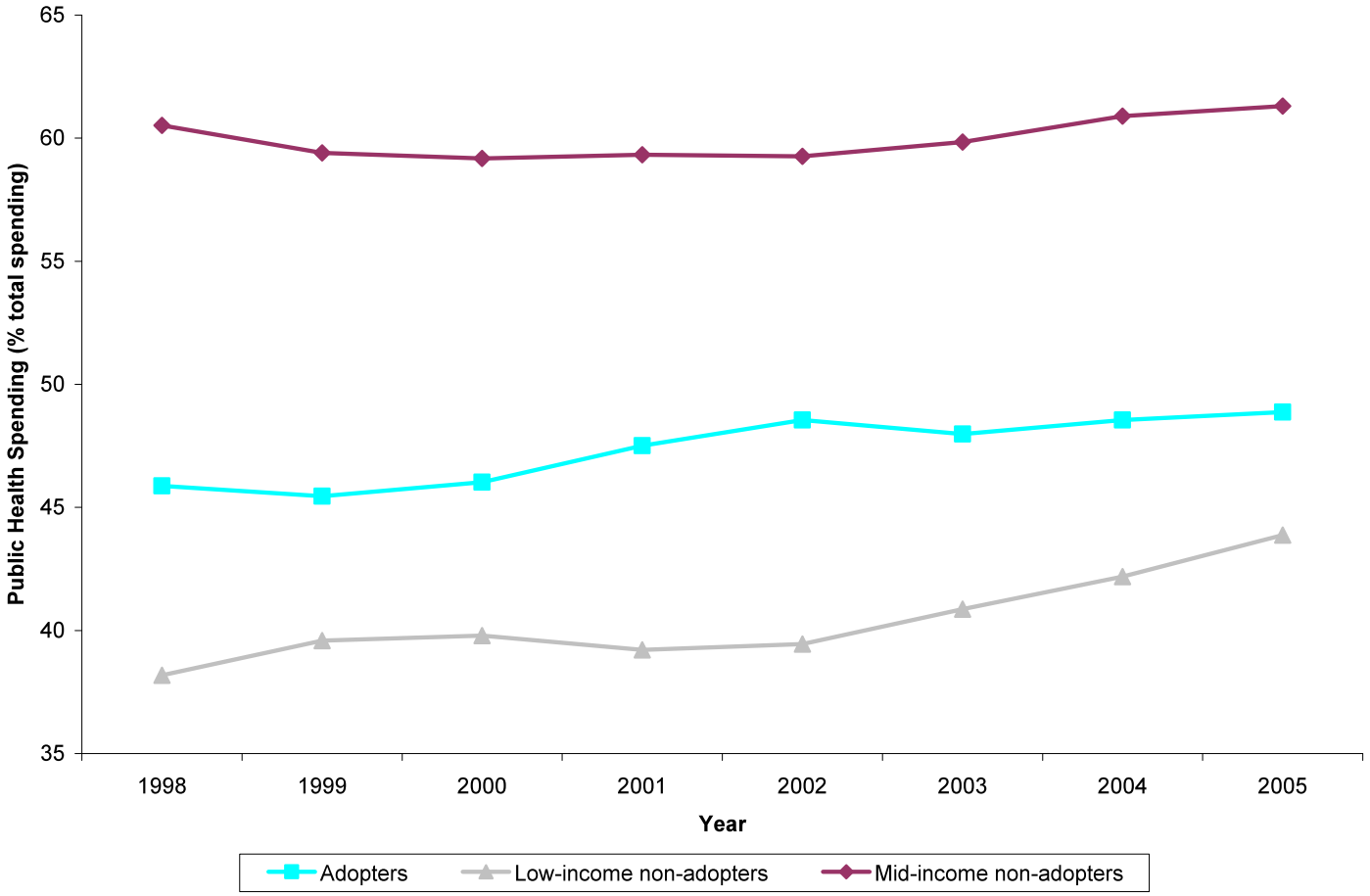

Figure 3. Vaccination Coverage over Time, by PRSP Adoption Status