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Health Insurance and Children in Low- and Middle-income Countries: A Review

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We conduct the first systematic review of the impact of health insurance on children and their households in low- and middle-income countries where nine-tenths of the world's child population reside. We find only 13 studies for seven countries published between 2000 and 2014 which assess the insurance impacts for children, controlling for self-selection and heterogeneity. Nine out of 10 studies reviewed provide consistent evidence that health insurance provides financial protection. The results are more mixed for health utilisation and health outcomes. Policy-makers would benefit from additional research on whether and how health insurance benefits children.

I Introduction

This review centres on the effects of health insurance programs in low- and middle-income countries (LMICs) on the health and health-care outcomes for children. The health of children is widely understood as an inherently important component of their wellbeing and instrumental in promoting their productivity as adults (Behrman & Rosenzweig, 2004). Populations in many parts of the world are young, especially in LMICs. For instance, in Africa, children under age 15 account for 41 per cent of the population (United Nations, 2015). The health of children is therefore central to global human, economic and social development. This was reflected in the explicit identification of child health as a key component of the Millennium Development Goals (MDGs) and in the more recent Sustainable Development Goals (SDGs; United Nations Development Programme, 2016).

Significant advancements have been achieved. The rate of mortality for children under the age of 5 worldwide almost halved over the period 1990–2013 (Sepulveda & Murray, 2014; Wang *et al.*, 2014). However, the reduction fell short of the targeted two-thirds in the MDGs. Progress on maternal health has been less impressive, with only one-third of the targeted reduction rate in maternal mortality rate achieved (26 per cent, compared to 75 per cent). Diseases remain a substantial cause of preventable child deaths. In 2013, malaria, lower respiratory infections and diarrhoea collectively accounted for approximately one-third of childhood deaths. Child health therefore continues to be a cornerstone in the new SDGs (United Nations Development Programme, 2016).

JEL classifications: I13, J13, J15

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As a way to improve health and equity in access to health services for children as well as adults, many LMICs are moving towards universal health coverage (UHC), defined by the World Health Organization (WHO) as 'all people receiving quality health services that meet their needs without being exposed to financial hardship in paying for the services' (WHO, 2014). While UHC is currently very high on the global health agenda, the road to achieving it is far from straightforward. Currently little consensus exists on how LMICs should structure their reforms to move towards UHC (Lagomarsino *et al.*, 2012). There are multiple ways to increase the funds available to health care, including taxation, health insurance, out-of-pocket payments and innovative mechanisms such as external donor assistance (WHO, 2010). In reality, countries employ a mix of these strategies. It is generally agreed that out-of-pocket payments are a regressive form of health financing with harmful consequences for the poor. WHO (2010) makes strong policy recommendations to reduce direct payments for health care through risk pooling and prepayment for people who can afford to pay, either through taxation and/or insurance contributions (WHO, 2010).

Health insurance has become an important mechanism through which many LMICs are committing to UHC. Systems typically comprise a collection of contributory and non-contributory schemes targeted to a range of population groups. Most systems include all or a combination of the following: a compulsory contributory scheme for civil servants and formal sector employees; a non-contributory scheme for social beneficiary groups such as the poor and persons with disabilities; and a voluntary contributory scheme for informal sector workers and anyone else willing to pay a private premium. In theory, through the collection of premiums from the non-poor, the system is able to subsidise premiums for the poor or near-poor. However in practice, premiums collected from the formal sector in LMICs are insufficient and states commonly subsidise the premiums of voluntary schemes. Yet the take-up is often low, as demonstrated by the case of Vietnam where approximately 40 per cent of the population remains uninsured, the majority of whom are people working in the informal sector.[1] Thailand represents a unique case where since 2001, premiums for the informal sector have been paid fully out of the state budget with enrollees subject to a 30 baht co-payment, making it the first LMIC to achieve UHC. In most instances, schemes are publicly provided. India presents an exception, with significant efforts being made to expand the private insurance system alongside state government-sponsored health insurance schemes (La Forgia & Nagpal, 2012).[2] Schemes may be provided at the national or community level, with the former seemingly most common.

Children can be covered under any of the contributory or non-contributory schemes outlined above. There are schemes that specifically target children and schemes for the general population under which children may become eligible, such as non-contributory schemes for the poor or as dependants of compulsory contributory schemes. Many countries have expanded health insurance coverage to school-aged children through targeted non-contributory programs. For instance, in 1992, Egypt introduced its School Health Insurance Programme, which provided free health insurance to children of primary school age (Yip & Berman, 2001). The Philippines expanded insurance coverage among school-age children seeking care in 30 randomly selected treatment sites (Quimbo *et al.*, 2011). In Vietnam, by contrast, school-aged children were included among 'voluntary' insurance target groups yet were strongly encouraged by schools to pay the state-subsidised private premium. Later, in 2005, preschool-aged (<6 years) children in Vietnam became eligible for non-contributory health insurance. It is also common for children to be included in non-contributory health insurance programs targeted to mothers and their children. For example, Colombia created its Contributive and Subsidised Regimes of insurance coverage during the 1990s, which provided generous benefits to mothers and their newborns (Camacho & Conover, 2013). Bolivia established its National Maternal and Child Insurance before expanding it into a national public health insurance program. Similarly, Malawi introduced maternal and newborn health insurance in 2004 in response to the MDGs (Brenner *et al.*, 2014).

Several reviews of the impact of health insurance exist, but none specific to children (e.g. Giedion & Díaz, 2010; Spaan *et al.*, 2012). There is a clear need for a review of the impact of health

[1] Calculation by authors using the Vietnam Household Living Standards Survey 2010.

[2] By 2010, 19 per cent of the population was covered by the government-sponsored schemes while another 25 per cent held private insurance.

insurance programs on children, given the central role of the health of children to human development, and because a number of countries have implemented reforms to expand health insurance coverage through programs targeted at children (e.g. Vietnam). The demand for health care for children may have a different price elasticity than that for adults (Leibowitz *et al.*, 1985; Sauerborn *et al.*, 1994; Ching, 1995), which may lead to different effects for children than for adults. To our knowledge, this article is the first systematic and comprehensive examination of the effect of health insurance on utilisation, financial protection and health outcomes for children in LMICs. It aims to inform future research and interventions related to UHC in general, and for children in particular. We limit our review to studies that apply rigorous impact evaluation methods as those that best inform evidence-based policy. Studies were identified based upon an extensive search of bibliographic databases covering published articles in health services research, medical and social sciences journals. We provide a theoretical and empirical background for the study, then organise and synthesise results before discussing the findings and their implications for future research.

II Background

(i) Expected Impact of Health Insurance

According to economic theory, health insurance coverage is expected to lead to greater health-care utilisation by reducing the cost of care (Phelps, 1997). In turn, health insurance is expected to improve health. The effect on total out-of-pocket health expenditures, however, is less clear due to the offsetting effect of an increased number of visits. If the price elasticity of demand for health care is less than 1, then health insurance should reduce out-of-pocket health expenditures for the individual.

If all household members are covered by health insurance, then health insurance should reduce out-of-pocket health expenditures for the family. If only some household members are eligible for health insurance, there might be an offsetting effect across members. For instance, household out-of-pocket expenditures may stay the same, while increasing for those without insurance and decreasing for those with insurance. Finally, with respect to health status, to the extent that health insurance improves access to quality services, health insurance is expected to improve health.

The analysis of the expected impact of health insurance on health-care utilisation is complex as one looks into the type of service, supply-side considerations and the broader context of health systems in LMICs. One expects an increase in outpatient visits, whether for preventive care or acute care. For children, this is especially the case for preventive care, with, for instance, an expected increase in immunisations. The expected effect is less clear for inpatient visits due to increased preventative and primary health-care usage. Buchmueller *et al.* (2005) claim that a lack of insurance may cause inefficient use of medical care and avoidable hospitalisations (inadequate prevention and excessive reliance on inpatient care). Expanding health insurance coverage may thus lead to reductions in some types of hospital utilisation.

The nature of the effect on the utilisation of different types of services is also affected by the characteristics of the health insurance program (benefits, co-payments) and supply-side considerations, which are not homogeneous across programs and countries. Extending coverage to the uninsured may impact the aggregate demand for health-care services. Health-care providers may consequently adjust to changes in demand. Given capacity constraints, providers may adjust their services to respond to the demand from the newly insured, which may change the nature of public services provided, that is, towards those who would typically be covered by health insurance program expansions. In turn, this might lead to a reduction in the quality of public services provided and to a subsequent switch to the utilisation of private services.

Finally, factors specific to the LMIC context may influence the impact of health insurance, including a lack of awareness of or trust in public programs and a lack of access to health-care infrastructure (e.g. Svoronos *et al.*, 2014).

(ii) Identification Issues

Identifying the effects of health insurance is very challenging. A simple comparison of means for the insured and the uninsured using observational data does not help, since health insurance coverage is not random, but rather the outcome of demand and supply factors, some of which are a function of health status and individual or household preferences. A simple comparison would give biased estimates: it would reflect the causal effect of health insurance combined with the effect of unmeasured characteristics that are correlated with health insurance coverage. The direction of the bias due to unobserved heterogeneity is unclear. It could be positive due to

adverse selection. Children in worse health are more likely to demand health insurance, but also to demand more health care. The bias could be negative when health insurance programs are made available to children who are likely to be healthier, such as children enrolled in school. An additional challenge is that health insurance expansions could be part of broader health sector reforms that simultaneously affect the supply and demand side of health care, which makes it difficult to isolate the effect of health insurance.

The best-known, and only long-term, experimental study on the impact of health insurance on care utilisation and health outcomes is the RAND Health Insurance Experiment conducted in the USA in the 1970s and 1980s, which found that participants who received free care used more health care than those who paid a co-payment (Manning *et al.*, 1987). The study showed little difference in the health outcomes of participants who received free care compared to those who paid a share of their health care. It is noted that the study did not evaluate the impact of having insurance *per se* but rather randomised individuals by level of co-payment.

III Methodology

(i) Inclusion Criteria

This review included evaluation studies that had the following characteristics:

1 Studies assessed the impact of health insurance on at least one quantifiable outcome for children and/or households.
2 Studies were conducted in LMICs as per the World Bank country classification.
3 Studies were published or made available since 2000. This criterion was used to include studies with recent or current relevant policy contexts.
4 Studies covered universal health insurance programs (for the entire population) and health insurance programs targeted at children. Health insurance programs targeted at pregnant mothers are beyond the scope of the study.[3]
5 This literature review is limited to studies that use a rigorous econometric analysis that attempts to address the endogeneity of health insurance. This can be done when subjects are randomly assigned to different health insurance coverage as in the case of the RAND experiment mentioned above. Besides randomised controlled trials, most commonly used methods mainly include the following: difference-in-difference estimation, propensity score matching, regression discontinuity, instrumental variable methods, or a mix of these methods (Khandker *et al.*, 2010). Using one of the methods above was not necessarily considered enough for a study to be included: three of the authors read and assessed the quality of the evaluation design for all screened papers.

[3] However, in studies of universal health insurance programs, and in studies of programmes targeted at children in settings that also have maternal programmes, the measured impact of health insurance on children may include, to some extent, the impact on children of providing health insurance to pregnant mothers.

(ii) Search Strategy

Relevant reports and papers, both published and unpublished, were identified according to the following steps:

1 *Electronic databases*. We conducted several database searches. We started with three databases where relevant quantitative impact evaluations were expected to be found: EconLit, the Impact Evaluation Repository of the International Initiave for Impact Evaluation (3ie), and PubMed. In addition, as a check, we performed a cross-database search using the EBSCO Discovery Service (OneSearch) that covered the following databases: Medline, SocIndex, Science Direct, JSTOR journals, PsycInfo and SocWork Abstracts.
2 *Citation chasing*. The reference list of every included paper was checked to identify any possible additional studies.
3 *Internet searches*. Finally, we used the advanced search options in Google and Google Scholar for a search of the World Wide Web.

In each database, we used combinations of keywords that dealt with: (i) relevance to the research question (health insurance, health coverage, children); (ii) relevance to the LMIC context (LMIC, developing country); (iii) outcomes such as health-care utilisation, health expenditures, and health outcomes (e.g. stunting, child wasting); and (iv) econometric analysis (impact evaluation). The search was restricted to English-language studies.

(iii) Screening

Several database searches led to several thousand citations in total. Many citations could

easily be excluded given the lack of relevance based on the title. If the study was included based on the title, the abstract was then reviewed. If the study was included based on the abstract, the full text of the article was retrieved and checked against the inclusion criteria above. We report below on our main database searches. Other searches (within the same database using different terms, or in different databases) did not lead to any additional results.

The EconLit search with 'health insurance' and 'children' as search terms connected with the Boolean operator (AND) yielded 246 papers, of which we included seven published or working papers.

The 3ie repository, using 'health insurance' as a search term, led to 69 results, of which we included six papers (two of these six papers had already been found in EconLit).

The PubMed database (using 'health insurance', 'children' and 'developing countries') led to 211 papers: we excluded all but two studies, both of which had already been found in the EconLit and 3ie searches.

We checked the results of the above searches with a cross-database search using the EBSCO Discovery Service for the cross-database search. This search yielded 838 records, none of which were in addition to those that had been previously identified through the search of EconLit, Pub Med and the 3ie repository.

Finally, through citation chasing and internet searches, we identified two more papers, leading to a total of 13 papers.

It should be noted that we do not aggregate the outcomes of the studies into a meta-analysis. Many of the outcome measures and estimation strategies that we found were not comparable across studies, and the insurance programs were different across countries. It would thus be misleading to aggregate their results.

IV Results

In total, the review led to 13 papers that cover health insurance expansion programs in seven countries: Burkina Faso, Colombia, China, the Philippines, Rwanda, Thailand and Vietnam. The characteristics of each of these programs are presented in Appendix Table A1. An overview of these articles is given in Table 1 and each of them is synthesised in Table 2. Results in Tables 2–4 are first listed for programs targeted at children and then for other programs. Seven out of 13 papers are concerned with health insurance expansion for the general population in Burkina Faso (Fink *et al.*, 2013), China (Wagstaff & Yu, 2007; Chen & Jin, 2012), Colombia (Giedion & Uribe, 2009; Miller *et al.*, 2013), Rwanda (Lu *et al.*, 2012), and Thailand (Gruber *et al.*, 2014). Five papers cover health insurance programs targeted at children in the Philippines (Kraft *et al.*, 2009; Quimbo *et al.*, 2011) and Vietnam (Wagstaff & Pradhan, 2005; Nguyen & Wang, 2013; Guindon, 2014; Palmer *et al.*, 2015). It should be noted that one paper (Guindon, 2014) deals with both a program targeted at children and a program for a larger population.[4]

TABLE 1
Overview of 13 Studies in the Review

	Number of studies
Scope of insurance programs*	
Programs targeted at children	5
Other programs	9
Methodology	
Difference-in-difference (DID)	3
Propensity score matching (PSM)	1
DID and PSM combined	4
Randomised controlled trial	3
Regression discontinuity design	2
Relevant outcomes	
Service utilisation	10
Financial protection	9
Health outcomes	10

Note: *One study (Guindon, 2014) covers a program targeted at children and another program that is not targeted, hence the number of studies here sums to 14.

With respect to methodology, three articles used a difference-in-difference design (Nguyen & Wang, 2013; Gruber *et al.*, 2014; Guindon, 2014), one paper used propensity score matching (Lu *et al.*, 2012), four papers used difference-in-difference and propensity score matching combined (Wagstaff & Pradhan, 2005; Wagstaff & Yu, 2007; Giedion & Uribe, 2009; Chen & Jin, 2012), three papers used a randomised controlled trial (Kraft *et al.*, 2009; Quimbo *et al.*, 2011; Fink *et al.*, 2013), and two papers used a regression discontinuity design (Miller *et al.*, 2013; Palmer *et al.*, 2015).

[4] Its characteristics and results are listed for the two programs separately in Tables 2–4.

TABLE 2
Descriptions of Studies

Reference	Country	Insurance program	Methodology	Data	Sample size	Utilisation	Financial protection	Health Outcomes
Programs targeted at children								
Guindon (2014)	Vietnam	Free Care for Children under Six (FCCU6)	DID	Vietnam Household Living Standards Survey (VHLSS) 2004, 2006	6,923 children	Number of inpatient visits Number of outpatient visits		Number of sickness days Number of bed days
Kraft *et al.* (2009)	Philippines	Philippine Child Health Insurance and Policy Experiment	Randomised controlled trial	Quality Improvement Demonstration Study (QIDS) 2003/2004, 2006	4,070 children	Delay in utilisation	Total health expenditures	C-reactive protein positive (infection) wasting
Nguyen and Wang (2013)	Vietnam	Free Care for Children under Six (FCCU6)	DID Control group of 6–7-year-olds	Vietnam Household Living Standard Survey (VHLSS) 2004, 2006	4,093 children	Outpatient visits (public, private) Inpatient visits (public only)	OOP expenditures Probability of catastrophic expenditures	Number of sick days
Palmer *et al.* (2015)	Vietnam	Free Care for Children under Six (FCCU6)	Regression discontinuity design	Vietnam Household Living Standards Survey (VHLSS) 2006, 2008, 2010	18,517 children	Outpatient visits (number and probability, public and private) Inpatient visits (number and probability)	Expenditures per visit	
Quimbo *et al.* (2011)	Philippines	Philippine Child Health Insurance and	Randomised controlled trial	Quality Improvement Demonstration Study (QIDS)	1,100 children			Wasting and having an infection

TABLE 2
(continued)

Reference	Country	Insurance program	Methodology	Data	Sample size	Utilisation	Financial protection	Health Outcomes
		Policy Experiment		2003/2004, 2006				tested through C-reactive protein at discharge and lagged
		Targets poor children, hospital users						
Other programs								
Chen and Jin (2012)	Rural China	New Cooperative Medical System (NCMS); introduced to some provinces by 2006	PSM and DID combined	China Agricultural Census (CAC) 2006 for eight low income rural counties	1.4 million individuals children: NA			Under-5 mortality
Fink *et al.* (2013)	Burkina Faso	Community-Based Insurance	Randomisation of the rollout of the insurance scheme	Nouna Health and Demographic Surveillance Site Survey, 2003 –2008	240 children under 5		OOP expenditures	Under-5 mortality
							Catastrophic level expenditures	
Giedion and Uribe (2009)	Colombia	Subsidised Regime (SR)	For expenditures: Instrumental variable for CR and PSM for SR	Demographic and Health Survey 1995, 2005	NA	Likelihood for child under age 1 to visit health-care facility if coughing or suffering from diarrhoea	Probability of catastophic health care expenditures for SR population	
		Contributory Regime (CR)	For other outcomes: PSM and DID combined	Living Standards Measurement Survey 2003		Immunisations		

TABLE 2
(continued)

Reference	Country	Insurance program	Methodology	Data	Sample size	Utilisation	Financial protection	Health Outcomes
Guindon (2014)	Vietnam	Free Care for Children under Six (FCCU6) Voluntary Health Insurance for school children and students	DID	Vietnam Household Living Standards Survey (VHLSS) 2004, 2006	1,119 children	Number of inpatient visits		Number of sickness days
Gruber *et al.* (2014)	Thailand	30 Baht program: Coverage of general population for services at public facilities, reduction of copay down to 30 baht (75c per visit)	DID	Health & Welfare Survey 2001, 2003, 2005	383,469 individuals	Number of outpatient visits Inpatient utilisation rate		Number of bed days Infant mortality rate at the province level
Lu *et al.* (2012)	Rwanda	*Mutuelles*, community-based health insurance program	PSM	Integrated Living Conditions Survey 2000, 2005/2006	7,304 children	Health care facility visit for acute respiratory infection, fever or diarrhoea for children under 5	OOP expenditures	
			PSM with instrumental variable	Rwanda Demographic Health Survey 2000, 2005, 2007/2008			Catastrophic health spending	
Miller *et al.* (2013)	Colombia	Subsidised regime	Regression discontinuity design	2005 Demographic & Health Survey	1,161 children	Use of preventive care	Individual inpatient	Days lost due to illness

TABLE 2
(continued)

Reference	Country	Insurance program	Methodology	Data	Sample size	Utilisation	Financial protection	Health Outcomes
							medical spending	
				2003 Encuentas de Calidad de Vida		Use of curative care	Individual outpatient medical spending	Cough, fever, diarrhoea
								Any health problem
Wagstaff and Pradhan (2005)	Vietnam	Voluntary health insurance	DID and PSM combined	Vietnam Household Living Standard Survey (VHLSS) 1992/1993, 1997/1998	17,824 individuals children: NA	At least one contact with a health service provider among sick (probability)	OOP health expenditures	Birthweight Weight for age (children)
							Non-medical household expenditures	Height for age (children)
Wagstaff and Yu (2007)	China (Gansu Province)	World Bank's Health VIII Project: program which includes supply- and demand-side reforms, incl. community health insurance for general population	DID and PSM combined	Gansu Survey of Children and Families, June 2000 to mid-2004 Survey focused on families with children aged 9–12	1,334 children	Taken to doctor in last year	Catastrophic health spending	Ill in the last year
						Highest level provider used in 12 months		

Notes: This table only includes outcomes relevant to children or to their households. The definition of catastrophic spending may vary from study to study. It is usually expressed as a share of out-of-pocket (OOP) expenditures out of per capita income. For instance, Wagstaff and Yu (2007) define catastrophic spending as share of annual spending in excess of 10% per capita income. NA stands for not available. DID refers to difference in difference, and PSM to propensity score matching.

The studies use a variety of outcomes: ten studies have service utilisation outcomes, nine have financial protection outcomes, and ten have health outcomes. It should be noted that in these studies, utilisation and health outcomes are measured at the child level, while financial protection is typically measured at the household level. Only three studies pay attention to subgroups of children or their households: Giedion and Uribe (2009) among urban, rural, poorest and poor quintiles; Wagstaff and Pradhan (2005) and Wagstaff and Yu (2007) by income quintile.

(i) Effects on Service Utilisation

Ten studies assessed the impact of health insurance on health-care utilisation in six countries. Their main results are presented in Table 3. Broadly, health-care utilisation refers to individuals seeking care for ailments, injuries or preventive care. Services may include well care visits, sick and emergency outpatient care, and inpatient care (hospital admissions). Several papers use broad health-care utilisation outcome measures, such as any contact with a service provider (Wagstaff & Pradhan, 2005) while other papers use specific service utilisation indicators such as visits to health-care providers among children under 5 with acute respiratory infections, diarrhoea or fever (Lu *et al.*, 2012).

Six of these ten studies find positive effects of health insurance on care utilisation for children (Giedion & Uribe, 2009; Kraft *et al.*, 2009; Lu *et al.*, 2012; Miller *et al.*, 2013; Gruber *et al.*, 2014; Palmer *et al.*, 2015). For instance, for Colombia, Giedion and Uribe (2009) find that the likelihood that a child gets immunised and that a child with a cough visits a health-care facility were 6.1 per cent and 10.7 per cent greater respectively for those under the insurance program (Giedion & Uribe, 2009). For Thailand, Gruber *et al.* (2014) show that the '30 Baht' program led to a 12 per cent increase in inpatient health service utilisation for the overall population during its first 4 years. For infants (0–1 years of age) and women of child-bearing age service utilisation grew 2.5 times faster. In the Philippines, Kraft *et al.* (2009) find that delays in seeking care were 5.3 per cent lower in health insurance intervention sites than compared to control sites.

The other four studies have mixed results, depending on the age group of children, the type of services (e.g. inpatient versus outpatient), the unit of analysis or the evaluation methodology. Wagstaff and Yu (2007) have mixed results on the impact of the World Bank's Health VIII project in Gansu province, China, on the use of health services. For instance, it leads to an increase in hepatitis B immunisation at the county level, but has a negative impact on immunisations overall at the village level (this latter result is sensitive to the econometric specification). For the case of Vietnam, Wagstaff and Pradhan (2005) find for the Voluntary Health Insurance program that the probability of contact with a health-care provider for a sick person increases for children 5 and over, but not for children under 5. Guindon (2014) finds that Vietnam's health insurance program for children under 6 increases outpatient visits by 17 per cent but has no significant effect on inpatient admissions, while Nguyen and Wang (2013) find for the very same program a significant increase in inpatient care but no significant change in outpatient care. Both Guindon (2014) and Nguyen and Wang (2013) use difference-in-difference estimation strategies and the Vietnam Household Living Standard Survey. However, they use different control groups, which may explain the difference in results. Using an alternative regression discontinuity design, Palmer *et al.* (2015) find a positive utilisation impact for both inpatient and outpatient services. Consistent with Guindon (2014), the authors find a larger impact on outpatient service utilisation.

(ii) Effects on Financial Protection

We reviewed ten studies that analysed the effects of health insurance on financial protection. Financial protection is measured through catastrophic health spending and/or out-of-pocket health expenditures, and the variability of medical spending (Table 3). Catastrophic spending is understood as a level of health-care expenditures that exceeds a given threshold of income, which is typically proxied by consumption expenditures as a more permanent measure of income in LMICs settings. Thresholds and consumption expenditure types vary from study to study. For instance, Wagstaff and Yu (2007) define it as spending exceeding 10 per cent of total consumption expenditures, which is the most commonly used threshold when total expenditure is used as the denominator. In addition, one has to bear in mind that financial protection is usually measured at the household level. In the case of household-level outcomes, for insurance programs targeted at children, a lack of change in expenditures, for instance, could be due to a redistribution of

TABLE 3
Main Results on Utilisation and Expenditures

Reference	Results
Programs targeted at children	
Guindon (2014)	Increase in outpatient visits by 17% for children under 6
	No significant effect found on inpatient admissions for children under 6
Kraft *et al.* (2009)	Delays in seeking care were 5.29% lower in the intervention sites (insurance) than in the control sites
Nguyen and Wang (2013)	An increase in total utilisation (private and public), but not statistically significant
	Increase in inpatient admissions in public hospitals. No consistent effect was found on the number of outpatient contact in the public sector, nor in the private sector
	OOP spending and the probability of catastrophic spending was significantly reduced in one of two models
Palmer *et al.* (2015)	Insurance for children under 6 increases the probability of an inpatient visit (+6.8%) and an outpatient visit (+21.7%)
	Insurance increases the average number of inpatient (+1.13) and outpatient visits (+0.75)
	No significant impact with respect to OOP expenditures
Other programs	
Fink *et al.* (2013)	Insurance had negative but small effect on average OOP expenditures in the target areas, but reduced by 30% the likelihood of catastrophic health expenditure
Giedion and Uribe (2009)	Insurance improved access and utilisation for both the SR and the CR programs (e.g. child taken to health care facility when coughing (+10.7%) or having diarrhoea (+7.4%), child immunisation complete (+6.1%))
	Insurance has reduced the incidence of catastrophic health spending, especially among more disadvantaged groups (those in rural areas, poorest and self-employed)
Guindon (2014)	Twofold increase in inpatient admissions for school-age children and students, but no effect found on outpatient visits
Gruber *et al.* (2014)	Increase by 12% for the general population of the overall inpatient utilisation rate
	Increase in overall utilisation rate is 2.5 times bigger for women and infants
	Substitution of public for private care for general population
Lu *et al.* (2012)	Visits to health-care facilities for under-5 children with acute respiratory infection, diarrhoea, or fever increased two- to threefold due to insurance
	Reduction in OOP expenditures and in the probability of catastrophic health-care spending for overall population with health insurance
Miller *et al.* (2013)	SR eligibility is associated with reductions in the variability* of inpatient medical spending
	Significant increase in use of preventive care (preventive physician visit and number of growth development checks last year)
	No change found for curative medical care among children
Wagstaff and Pradhan (2005)	The probability of contact with a health-care provider for a sick person increased for children 5 and over (+3.9%), but not for children under 5
	Some reduction in OOP expenditures
	Increase in non-medical expenditures, by more than reduced OOP
Wagstaff and Yu (2007)	Little impact is found on the use of services (for instance, Increase in hepatitis B and polio immunisation at the county level, but negative impact on overall immunisations at the village level (although this result holds only for one specification)
	Reduced OOP spending, and the incidence of catastrophic spending and impoverishment through health expenses

Note: *Variability is defined as the difference between individual spending and county mean spending.

expenditures towards uninsured individuals in the household. Results thus need to be interpreted with caution.

The five papers that use catastrophic spending as a financial protection indicator find that health insurance reduces the likelihood of catastrophic spending (Wagstaff & Yu, 2007; Giedion & Uribe, 2009; Lu *et al.*, 2012; Fink *et al.*, 2013; Nguyen & Wang, 2013). Out of the six papers that use out-of-pocket health expenditures as an

TABLE 4
Main Results on Health Outcomes

Reference	Results
Programs targeted at children	
Kraft *et al.* (2009)	Authors infer that insurance may have positive effects on health outcomes and expenditures given that health insurance reduces delays
	Delays in seeking care by 2+ days increased probability of wasting by 4.6%
Nguyen and Wang (2013)	Number of sick days was reduced (statistically significant only at 10%) in one of two models
Quimbo *et al.* (2011)	At discharge: no effect on C-reactive protein (CRP)
	Post-discharge (4–10 weeks later): intervention reduces probability of testing CRP positive by 4–9 percentage points and of wasting by 9–12 percentage points
Other programs	
Chen and Jin (2012)	Effect found on child mortality and school enrolment with raw data or PSM model. However, after controlling for selection bias by combining DID and PSM, the New Cooperative Medical System (NCMS) has no effect on under-5 mortality
Fink *et al.* (2013)	No significant effect on under-5 mortality was found
Guindon (2014)	No signicant effect of voluntary health insurance program found on number of sick or bed days for students
Gruber *et al.* (2014)	Reduction in infant mortality: a 10% increase in the fraction enrolled in the program reduced infant mortality by 0.65 per 1,000 births
Miller *et al.* (2013)	SR enrolment is associated with 1.4 fewer child days absent from usual activities due to illness in the past month
	18 percentage point reduction in the self-reported incidence of cough, fever or diarrhoea among children, but not statistically significant
Wagstaff and Pradhan (2005)	Children under 5 increased height- and weight-for-age by 2.35 cm (2%) and 0.75 kg (4%), respectively. No significant effect found for older children
Wagstaff and Yu (2007)	Reduction of illness among children*

Note: *This result for children is presented in the working paper of Wagstaff and Yu (2007) and is consistent with a similar effect for the entire population given in the published version.

indicator of financial protection, five find that health insurance has a negative and significant effect (Wagstaff & Pradhan, 2005; Wagstaff & Yu, 2007; Lu *et al.*, 2012; Fink *et al.*, 2013; Nguyen & Wang, 2013). Only Palmer *et al.* (2015) does not find evidence of a significant effect on out-of-pocket health expenditures for Vietnam's health insurance program for children under age 6. This result is consistent with the result of the Nguyen and Wang (2013) study of the same program for children aged 0–3, but different from the negative and significant impact on expenditures they find for children aged 4–5. This difference in results for children aged 4–5 could come from the difference in sample and methodology: Nguyen and Wang (2013) use a sample of non-poor children only with two waves of the Vietnam Household Living Standard Survey (2004 and 2006) and with a difference-in-difference estimation, while Palmer *et al.*'s (2015) estimates are for all children near the age cut-off of 6 using regression discontinuity and based on 2006, 2008 and 2010 Vietnam Household Living Standard Survey data.

Finally, Miller *et al.* (2013) find that insurance in Colombia is associated with reductions in the variability of inpatient medical spending, where variability is defined in terms of the difference between the individual medical spending and the county mean medical spending.

(iii) Effects on Health Outcomes

Ten of the 13 studies we examined assessed the impact of health insurance on health outcomes in LMICs. Their main results are presented in Table 4. Among the health outcomes were

mortality (Chen & Jin, 2012; Fink *et al.*, 2013; Gruber *et al.*, 2014), morbidity (Wagstaff & Yu, 2007; Quimbo *et al.*, 2011; Miller *et al.*, 2013; Nguyen & Wang, 2013; Guindon, 2014), anthropometric outcomes (Wagstaff & Pradhan, 2005; Kraft *et al.*, 2009; Quimbo *et al.*, 2011) and broad activity limitation (Miller *et al.*, 2013).

Four of the ten studies find that health insurance leads to health improvements (Wagstaff & Yu, 2007; Kraft *et al.*, 2009; Nguyen & Wang, 2013; Gruber *et al.*, 2014). For instance, Gruber *et al.* (2014) find a reduction in infant mortality: a 10 per cent increase in the fraction enrolled in the program reduced infant mortality by 0.65 per 1,000 births.

Three studies had results that were mixed (Wagstaff & Pradhan, 2005; Quimbo *et al.*, 2011; Miller *et al.*, 2013). Quimbo *et al.* (2011) find that insurance sites during the random trial[5] experienced a 9 per cent reduction in the probability of wasting but no statistically significant difference between insured and uninsured in the rate of infection detected at hospital discharge. Miller *et al.* (2013) find no significant effect on the incidence of cough but a significant reduction in the number of days when children are not able to do their usual activities. Wagstaff and Pradhan (2005) find improvements in anthropometric outcomes among children under 5 but not among older children.

Finally, three other studies (Chen & Jin, 2012; Fink *et al.*, 2013; Guindon, 2014) do not find any significant effect on health outcomes (number of sickness or bed days and under-5 mortality, respectively).

V Discussion and Conclusions

Despite a growing and large literature on the impact of health insurance in LMICs (Giedion & Díaz, 2010; Spaan *et al.*, 2012), we find only 13 studies for seven countries that assess the impact of health insurance on children. Nine out of 10 studies reviewed in this paper provide consistent evidence that health insurance provides financial protection. The results are more mixed when it comes to health-care utilisation and health outcomes: a positive effect was found in six out of 10 studies for health-care utilisation and in four out of 10 studies for health outcomes. For health-care utilisation, the other four studies offer mixed results.

A number of interesting discussion points emerge from this review. The general synthesis of results for the 13 studies is that insurance helps with financial protection while providing mixed impact on utilisation and health outcomes for children. This stands in contrast to results of other reviews. For instance, Giedion *et al.* (2013), considering broadly universal health care, finds that insurance tends to increase levels of utilisation across all services but has little to no impact on financial protection. For the informal sector, Acharya *et al.* (2013) find no evidence that health insurance in the informal sector impacts utilisation, financial protection and health outcomes.

The mixed results in this review regarding overall utilisation may be explained by the fact that children under insurance tend to use primary and preventative services at a higher rate than inpatient services. Two studies in Vietnam found a larger impact of health insurance on the use of outpatient relative to inpatient care for children under the age of 6 (Nguyen *et al.*, 2012; Palmer *et al.*, 2015). This finding is consistent with the RAND experiment where co-payments did not affect the probability of an inpatient visit of children (Manning *et al.*, 1987). Improved access to primary and preventative care such as immunisations through outpatient contacts may have led to a reduction in the probability of hospitalisation for insured younger children. These services are also typically better covered than inpatient services under insurance, which may explain negative impacts on the financial burden of accessing care.

Several studies cover the same programs in Vietnam. Two studies cover the Voluntary Health Insurance program and its impact on school-age children and have consistent results overall, although the data come from the 1990s for Wagstaff and Pradhan (2005) and from the 2000s for Guindon (2014). In addition, three studies assess Vietnam's health insurance program for children under age 6 using the same data but different methods. They return findings that are somewhat different on health-care utilisation and financial protection. For instance, Palmer *et al.* (2015) find a significant increase in both outpatient and inpatient utilisation, while Guindon (2014) finds a significant effect only for outpatient visits, and Nguyen and Wang (2013) do not.

[5] The trial was conducted in the late 1990s and early 2000s.

To the extent that different methods address endogeneity in differing degrees, concerns of self-selection and unobserved heterogeneity may be a significant issue, at least in the case of health insurance for young children in Vietnam. Furthermore, the estimation of different treatment effects – local average treatment effect for regression discontinuity (Palmer *et al.*, 2015) versus average treatment effect for the difference-in-difference estimation strategy for the other two papers – may have contributed to the different findings. These different results for Vietnam's programs contrast with those from a review of the literature in the United States where studies with different methods lead to similar results (Buchmueller *et al.*, 2005).

This review is not without limitations, and thus gives rise to opportunities for further research. The greatest limitation relates to the small number of robust studies on the topic. More research is needed that evaluates the impact of health insurance programs on children in LMICs, as many countries are adopting or are considering adopting health insurance programs, or are broadly moving towards universal health care. The findings of the review are of course constrained by the limitations of the studies in the literature. Many studies on the impact of universal health insurance programs in LMICs do not present separate results for children and thus did not meet the search criteria of this review (e.g. Jowett *et al.*, 2003; Axelson *et al.*, 2009; Wagstaff, 2010; Nguyen, 2011). This represents a missed opportunity to understand the health-seeking behaviours and health outcomes of this important subpopulation. More research is needed that evaluates the impact of health insurance programs targeted at children, and studies that assess the impact of insurance programs for all ages need to separate out effects on children.

In addition, in the seven studies on health insurance programs for all ages included in this review, a comparison of results on utilisation and health outcomes for adults and children is done in only three studies (Chen & Jin, 2012; Fink *et al.*, 2013; Lu *et al.*, 2012). In three studies, the comparison is not possible because different utilisation or health outcome indicators are used for children (e.g. immunisations completed). When generic indicators are used (e.g. number of inpatient or outpatient visits), studies should, when possible, break down results for adults and children due to potentially different health-care-seeking behaviours as well as the inherent importance of child health to human development.

Future studies also need to document and identify the effects of specific characteristics of health insurance programs (e.g. benefits, co-payments) and of supply-side factors. Three-quarters of the papers under review are focused on Asian countries so there exists a geographical limitation, with only few impact evaluations for Africa and Latin America. In addition, only three studies reviewed in this paper evaluated impacts on subgroups of children. More nuanced research is needed on how health insurance affects children from ethnic minorities, children with disabilities, children with chronic health conditions and poor children.

Only three of the studies in the review analyse the supply-side aspects of the health insurance program or of a broader health-care reform (Wagstaff & Yu, 2007; Giedion & Uribe, 2009; Gruber *et al.*, 2014), and three more studies mention in the discussion how supply-side factors could be affecting their results (Chen & Jin, 2012; Fink *et al.*, 2013; Palmer *et al.*, 2015). Results suggest that supply-side considerations are important factors influencing the consequences of health insurance reforms on children. For instance, Gruber *et al.* (2014) find that increased funding of hospitals for the poor, and reduced co-payments, increased health-care utilisation, especially among the poor and reduced infant mortality in poorer provinces in Thailand. More attention needs to be paid to the supply-side factors and how they may influence results of health insurance programs.

Finally, the outcomes covered in the studies reviewed in this paper are limited by the data under study. They tend to be short-term outcomes and come from general household survey data that are collected for purposes other than studying health care and health insurance. They often lack details on insurance plans, health-care services and health status. For instance, regarding inpatient care, we found several studies that examine the effects of insurance on any hospital utilisation by children. However, these studies do not differentiate between avoidable and unavoidable inpatient care, as has sometimes been done in the literature in high-income countries (Buchmueller *et al.*, 2005). Some of the mixed results on the impact of health insurance on care utilisation and health outcomes are perhaps due to the limited information available in standard household surveys. For instance, measures of any contact with a

health provider in the past year are crude measures of health-care utilisation, and these may explain the Wagstaff and Pradhan (2005) finding that availability of health care has no effect for children under 5. Mortality used in some studies may be too crude a measure of health to capture health improvements that may result from health insurance and may explain why Chen and Jin (2012) and Fink *et al.* (2013) find no effect on under-5 mortality.

Further research is needed that enhances the study of service utilisation, financial protection, and health outcomes among children under insurance in LMICs. Service utilisation indicators should be directly related to the benefits expected for the health insurance program under study. Health outcome indicators should be directly related to the health-care services that are expected to be affected by health insurance and that are likely to lead to health improvements (e.g. immunisation). Non-health outcome indicators should also be considered: only one of the studies in this review covered a non-health outcome: Chen and Jin (2012) considering school enrolment.

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Appendix

TABLE A1
Characteristics of the Insurance Programs

Country	References	Scheme name	Target beneficiaries	Eligibility age	Financing	Administration	Level
Programs targeted at children							
Philippines	Kraft *et al.* (2009), Quimbo *et al.* (2011)	Philippine Child Health Insurance & Policy Experiment (or the Quality Improvement Demonstration Study)	Young children	6 Months to 5 Years	Government revenue	Public	Regional
Vietnam	Guindon (2014), Nguyen and Wang (2013), Palmer *et al.* (2015)	Free Care for Children Under Six (FCCU6)	Young children	<6	Government revenue	Public	National
Other programs							
Burkina Faso	Fink *et al.* (2013)	Community-Based Insurance (CBI)	All	All	Private premium	Public	Community
China	Chen and Jin (2012)	New Coorperative Medical System (NCMS)	Poor, rural	All	Government revenue, private payments (coinsurance)	Public	Regional
	Wagstaff and Yu (2007)	World Bank's Health VIII Project	Poor, rural	All	Government revenue, private payments (coinsurance)	Public	Regional
Colombia	Giedion and Uribe (2009)	Contributory Regime (CR)	For those not targeted by other plans	All	Private premium – individuals and employers	Private	National
	Giedion and Uribe (2009), Miller *et al.* (2013)	Subsidised Regime (SR)	Poor	All	Government revenue, private payments (coinsurance)	Public and private	National
Rwanda	Lu *et al.* (2012)	*Mutuelles de Santé*	For all those not targeted by other plans	All	60% private premium, low coinsurance; 40% government revenues	Public	Community-based but available nationally
Thailand	Gruber *et al.* (2014)	30 Baht	All	All	Government revenue + low co-pay	Public	National
Vietnam	Guindon (2014), Wagstaff and Pradhan (2005)	Voluntary Health Insurance	All	All	Private premium	Public	National