

# Increasing Health Insurance Enrollment in Low- and Middle-Income Countries: What Works, What Does Not, and Research Gaps: A Scoping Review

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## Abstract

Health insurance programs have the potential to shield individuals in low- and middle-income countries from catastrophic health expenses and reduce their vulnerability to poverty. However, the uptake of insurance programs remains low in these countries. We reviewed existing evidence from experimental studies on approaches that researchers have tested in order to raise the uptake. In the 12 studies we synthesized, educational programs and subsidies were the dominant interventions. Consistent with findings from previous studies on other health products, subsidies were effective in raising the uptake of insurance programs in many contexts. Conversely, education interventions—in their current forms—were largely ineffective, although they bolstered the effect of subsidies. Other strategies, such as the use of microfinance institutions and social networks for outreach and enrollment, showed mixed results. Additional research is needed on effective approaches to raise the uptake of insurance programs, including tools from behavioral economics that have shown promise in other areas of health behavior.

## Keywords

health insurance, interventions, experiments, low- and middle-income countries, universal health coverage

## Highlights

### What do we already know about this topic?

Although health insurance has the potential to protect individuals from catastrophic health expenses and to reduce their vulnerability to poverty, participation in insurance programs remains low in low- and middle-income countries. There is limited evidence on effective approaches to increase participation.

### How does your research contribute to the field?

We collated existing evidence on approaches that researchers have tested in order to raise the uptake of insurance programs. We focused on experimental and quasi-experimental studies, thus alleviating concerns about drawing evidence from studies with significant methodological limitations.

### What are your research's implications towards theory, practice, or policy?

The study provides insights into tools and strategies that can be leveraged to promote enrollment in health insurance programs in low- and middle-income countries. Thus, it is a useful reference for both development agencies and governments.

## Introduction

Globally, approximately 150 million individuals experience catastrophic health expenditures each year and 100 million of them are pushed into poverty because of these expenses.<sup>1</sup> Over 90% of the individuals impoverished by healthcare expenses reside in low- and middle-income countries (LMICs).<sup>2,3</sup> In response, governments in these countries have

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attempted to implement health insurance and social protection programs of varying scale and approach—all as a part of a broader effort toward universal health coverage and the attainment of the Sustainable Development Goals.

Notable forms of such programs include social health insurance (SHI), national healthcare insurance (NHI), and community-based health insurance (CBHI). The overarching objective of these programs is to protect the poor from the effects of unforeseen healthcare expenses by reducing out-of-pocket costs. A detailed description of these insurance models can be found elsewhere.<sup>4</sup> Briefly, SHI schemes involve contributions from the individuals, the employer, or the government, and are usually enacted through a statute of law.<sup>5</sup> In these schemes, the amount of contribution and the coverage do not depend on an individual's health risk profile. NHI, sometimes called a single payer system, involves a single purchaser—usually the government—paying for a package of services on behalf of the population within a geographic area.<sup>6</sup> Finally, CBHI programs are local schemes with arrangements for pooling and mobilizing contributions from members.<sup>7</sup> Typically, CBHI programs are based on voluntary membership, are not-for-profit, and offer a predetermined package of benefits to the beneficiaries.<sup>8</sup>

Despite the potential of these insurance programs to protect individuals from catastrophic healthcare expenses, their uptake is low across LMICs, and ranges between 5% and 25%.<sup>9,10</sup> To date, we have a limited understanding of effective approaches to increasing the uptake. Two previous reviews have attempted to fill this gap.<sup>11,12</sup> However, both reviews covered only CBHI programs and identified the broad determinants of the uptake of such schemes. In the current review, we built on that work and synthesized evidence from experimental and quasi-experimental studies on various approaches that researchers have tested in order to increase the uptake of health insurance programs and to promote retention. We did so for all types of health insurance programs in LMICs. Based on our synthesis, we identified several areas for further research that can help inform the design and implementation of future interventions.

## Methods

We conducted a scoping review of experimental and quasi-experimental studies on health insurance interventions in LMICs following the framework of Arkey and O'Malley (2005).<sup>13</sup> In line with the framework, our steps included specifying the research question(s) for the review, identifying relevant studies, charting data from the selected studies, and synthesizing the findings.

### Search Strategy

We retrieved records using PubMed (Medline), CINAHL, and PsychINFO electronic and Google Scholar databases. A

number of search terms were combined using AND and OR Boolean operators with the help of a librarian to retrieve the studies (see Appendix 1), separately from each database. We imported and assessed the retrieved studies for eligibility following the guidelines in COVIDENCE, a web-based software for scoping and systematic reviews.<sup>14</sup> After removing duplicate studies, the first author screened abstracts and full-text documents using an agreed set of inclusion and exclusion criteria (see below).

### Inclusion and Exclusion Criterion

We included primary research articles that met the following criteria: (1) the study design was either a randomized controlled trial (RCT) or a quasi-experiment, such as a difference-in-difference analysis; (2) the study examined health insurance uptake as one of the primary outcomes; (3) the study was based on SHI, CBHI, NHI, or a 'mixed' scheme—the common types of health insurance programs in LMICs; and (4) the country of study was classified as a LMIC by the World Bank.<sup>15</sup> We limited the sources to studies published in English between 2000 and 2022. A study was excluded if it met one of the following criteria: (1) only the abstract was available; (2) the study was based on forms of insurance other than health insurance (e.g., life insurance, livestock insurance); (3) the study used a case-control, cross-sectional, or qualitative design; and (4) the publication was an opinion piece, editorial, commentary, or a review.

### Data Charting

We extracted data from the selected studies into a pre-designed charting table. The data included country of the study, type of insurance program studied, and the study's main objective(s), key intervention(s), and main findings. We pre-tested the chart on three of the included studies to ensure feasibility, completeness, and consistency of data extraction, and iteratively refined the chart as needed. We adapted the Cochrane Risk of Bias Assessment tool to formally assess the quality of the studies.<sup>16</sup> We evaluated six potential sources of bias: selection, performance, detection, attrition, reporting (see Appendix 2). The two authors independently reviewed the sources and assigned an overall score for quality (high, medium, low, or unclear). Score disagreements were resolved through discussion.

## Results

Our initial search retrieved 1605 studies, of which 297 were duplicates (Figure 1). Of the remaining 1308 studies, 981 were excluded because they were not related to the study question and 315 were removed because they did not use an RCT or a quasi-experimental design or because they did not include enrollment as one of the outcomes. This resulted in 12 studies in the final review.

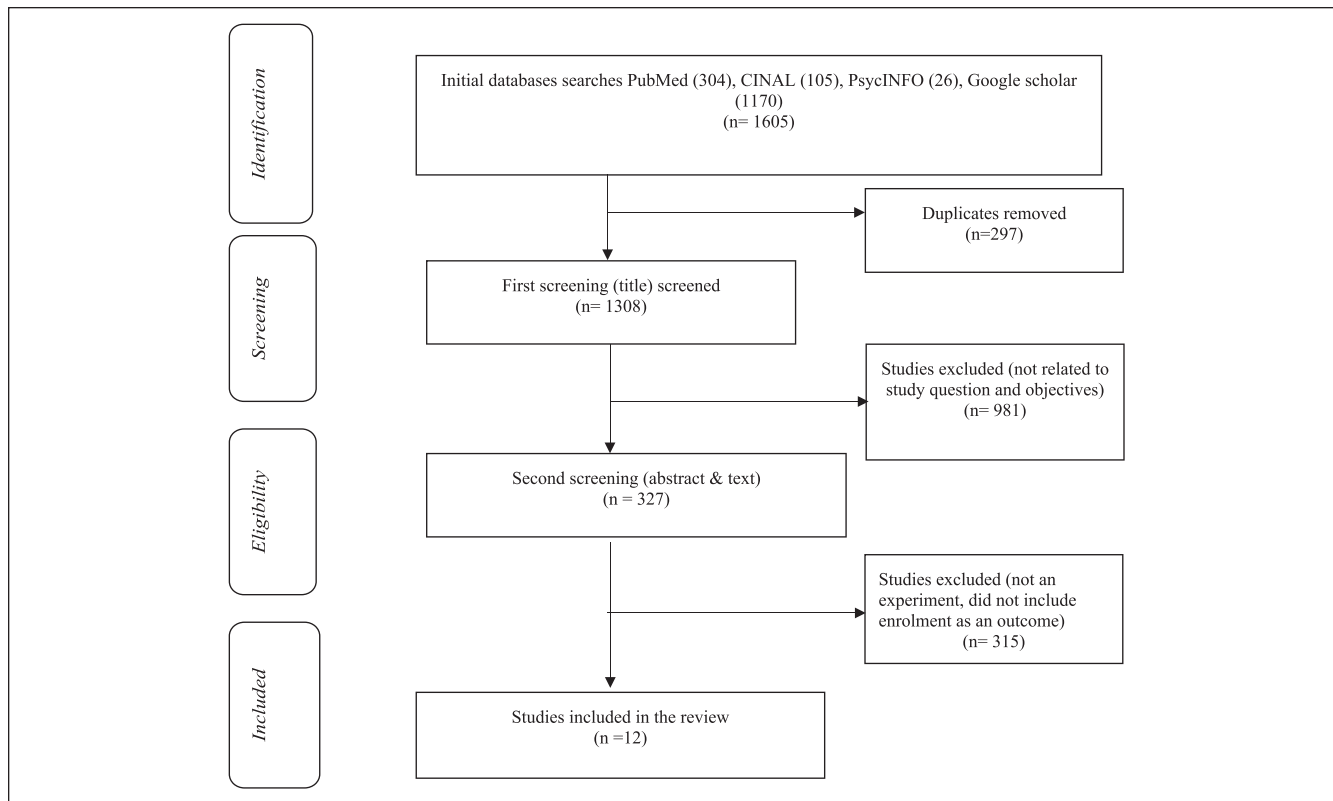


Figure 1. PRISMA flow diagram.

## Overview of the Included Studies

The 12 studies covered 10 countries (Table 1). Three studies were conducted in Burkina Faso<sup>17-19</sup> and one study was conducted in each of the following countries: Ghana,<sup>20</sup> India,<sup>21</sup> Indonesia,<sup>22</sup> Kenya,<sup>23</sup> Mexico,<sup>24</sup> Nicaragua,<sup>25</sup> the Philippines,<sup>26</sup> Senegal,<sup>27</sup> and Vietnam.<sup>28</sup> In terms of the type of insurance program, three of the studies examined the effect of their interventions on the uptake of CBHI programs,<sup>17,19,27</sup> six on the uptake of SHI,<sup>18,20,21,24,26,28</sup> and three on NHI.<sup>22,23,25</sup> Method-wise, 10 of the studies were RCTs,<sup>17,20-28</sup> while the remaining two were quasi experiments.<sup>18,19</sup>

Before synthesizing the studies' findings, a brief summary of each study is in order. In Africa, Bocoum et al (2019) analyzed the effect of providing information through multiple avenues (specifically, a brochure presenting factual information, a video presenting a hypothetical health episode and a personalized phone call reminder) by trained agents on the adoption of CBHI in rural Burkina Faso.<sup>17</sup> Asuming (2013) examined the effect of three interventions in northern Ghana: allowing individuals to sign up for insurance in their communities instead of having to travel to the district capital, an education campaign, and subsidies equivalent to one-third, two-thirds, or the full cost of the premium.<sup>20</sup> The author then used the resulting variation in insurance coverage to estimate the effect of enrollment on utilization, out-of-pocket expenses

and health outcomes. In this review, we focused on the first of part of their study. Chemin (2018) investigated the effect of three key interventions—information about health insurance, assistance to enroll, and small subsidies of 2, 10 or 30% of the membership fee—on uptake of in-patient health insurance in Kenya.<sup>23</sup> Finally, Bonan et al (2017) tested the effect of an insurance literacy module covering the benefits of health microinsurance and the functioning of local CBHI schemes, and that of three marketing treatments—specifically, varying levels of subsidies on membership fees—in Senegal.<sup>27</sup>

In Asia, Das and Leino (2011) conducted an information and education campaign in the context of India's flagship program, *Rashtriya Swasthya Bima Yojana*. They used a household survey as an intervention to gauge the extent to which surveys alone can alter the likelihood of enrollment.<sup>21</sup> Banerjee et al<sup>22</sup> (2021) investigated the effect of large, temporary subsidies, at-home registration assistance, and the provision of three types of information—emphasizing the financial costs of a health episode in relation to insurance prices, the presence of a waiting period from enrollment to coverage, or the fact that insurance coverage was mandatory—on enrollment in Indonesia's *JKN Mandiri* program.<sup>22</sup> Capuno et al (2016) tested two sets of interventions—information and a 50% premium subsidy—encouraging enrollment in the voluntary component of the Philippines' social

**Table 1.** Summary of the Studies Included in the Review.

Country Authors, and year	Insurance Type and Study Design	Primary Study Objective Relevant to the Review	Key Intervention(s)	Key Findings
Burkina Faso Bocoum et al (2019)	CBHI RCT Sample size: 2000 households	To analyze the impact of an information intervention on the understanding and adoption of CBHI in Burkina Faso	A combined information package—consisting of brochure presenting information, a video presenting a hypothetical health episode and a personalized phone call reminder—delivered by trained agents at multiple times.	<ol style="list-style-type: none"> <li>1) The intervention led to a modest improvement in the understanding of insurance principles, with the overall improvement driven by poorer households and households with literate heads.</li> <li>2) Uptake in the six months following the intervention was below 2%.</li> </ol>
Ghana Asuming (2013)	SHI RCT Sample size: 4625 individuals from 680 households	To understand the reasons for low enrollment in insurance programs and estimate the effects of insurance coverage on utilization of healthcare, financial protection and health.	Allowing individuals to sign up for insurance in their communities instead of having to travel to the district capital, an education campaign, and subsidies equivalent to one-third, two-thirds, or the full cost of the premium.	<ol style="list-style-type: none"> <li>1) Opportunity to enroll in the individual's community had no effect on enrollment.</li> <li>2) Subsidies, even at a low level, had a strong effect on enrollment.</li> <li>3) There was no evidence of complementarities among the interventions.</li> <li>4) Individuals from lower socioeconomic backgrounds and in poorer health were more responsive to the interventions, especially the education intervention.</li> </ol>
Kenya Chemin (2018)	NHI RCT Sample size: 1009 respondents	To determine ways to increase health insurance coverage among the poor in the National Hospital Insurance Fund	Twenty different combinations of interventions consisting of: (1) information about the National Hospital Insurance Fund (the main insurance provider in Kenya), (2) assistance to register (specifically, help with filling out the application form and taking pictures, either at the participants home or place of work), and (3) subsidies of 2, 10, or 30%. Additional interventions included: (1) provision of insurance information by community leaders, (2) in-kind gift (a chicken) for registering, (3) possibility to contribute lower and more frequent payments, and (4) possibility to pay the premium by cell phone.	<ol style="list-style-type: none"> <li>1) Large subsidies increased take-up, but the effect was small; a 100% subsidy generated only a 45% take-up</li> <li>2) Educational campaigns through informal groups raised take-up to 12%, as well as trust and knowledge of the insurance product.</li> <li>3) Other interventions, including the provision of information through community leaders and small subsidies, had no effect.</li> <li>4) Qualitative analysis identified lack of trust as a major barrier to enrollment.</li> </ol>
Senegal Bonan et al (2017)	CBHI RCT Sample size: 360 households	To evaluate the effect of an insurance literacy module covering the benefits and functioning of health microinsurance	A 3-hour insurance literacy training, followed by a marketing treatment in the form of one out of three vouchers (no refund, full refund of membership fees, and full refund of membership fees plus a refund of 250 CFA/month per new member).	<ol style="list-style-type: none"> <li>1) The insurance literacy training had no effect on enrollment.</li> <li>2) The marketing treatments had a large and positive impact on the households' decisions to purchase insurance.</li> </ol>

*(continued)*

Table I. (continued)

Country Authors, and year	Insurance Type and Study Design	Primary Study Objective Relevant to the Review	Key Intervention(s)	Key Findings
India Das and Leino (2011)	SHI RCT Sample size: 23836 households	To estimate the effect of Information Education Communication (IEC) on enrollment in <i>Rashtriya Swasthya Bima Yojana</i> , a flagship program of the government, and on hospital claims	IEC and a household survey, resulting in four blocks of households: IEC only, IEC + household survey, households survey only, and neither	<ol style="list-style-type: none"> <li>1) IEC had no impact on enrollment, except in conjunction with the household survey.</li> <li>2) Households who were part of the household survey and therefore received information closer to the enrollment period were 8–9 percentage points more likely to enroll.</li> <li>3) Households in the IEC + household survey group were an additional 5 percentage points more likely to enroll relative to control households that received neither the IEC nor the household survey.</li> </ol>
Indonesia Banerjee et al (2021)	NHI RCT Sample size: 5996 households	To examine the role of price (premium), transaction costs, and information constraints on enrollment in <i>JKN Mandiri</i> , a nationally mandated insurance program in Indonesia	Large, temporary subsidies (either 50% or 100% subsidy for the first year of enrollment if the households enrolled within two weeks after they were offered the subsidy), home assistance with the online registration system, and provision of three types of information: emphasizing the financial costs of a health episode in relation to insurance prices, the presence of a waiting period from enrollment to coverage, or the fact that insurance coverage was mandatory.	<ol style="list-style-type: none"> <li>1) Full subsidy increased enrollment by 18.6 percentage points, 50% subsidy by 10 percentage points, and home assistance on registration by 3.5 percentage points.</li> <li>2) Assisted registration led to 23.7 percentage points increase in attempted enrollment during the first 8 weeks but only a 4.3 percentage point increase in successful enrollment.</li> <li>3) Time-limited subsidies attracted healthier enrollees with fewer claims.</li> </ol>
Philippines Capuno et al (2016)	SHI RCT Sample size: 2950 households	To test two sets interventions encouraging enrollment in the voluntary component of the Philippines' social health insurance program	Information kit and a 50% premium subsidy valid for a year. Eligible households who had not enrolled by the end of the first year were resent enrollment kits and SMS reminders and their subsidy was extended. Half of the group was also offered "handholding": in the endline interview, the enumerator offered to help complete the enrollment form, deliver it to the insurer's office in the provincial capital, and mail the membership cards.	<ol style="list-style-type: none"> <li>1) Information kit and a 50% subsidy raised the enrollment rate by 3 percentage points, with an 8 percentage points larger effect among urban residents.</li> <li>2) The handholding intervention raised enrollment by 29 percentage points, with a smaller effect among urban residents.</li> </ol>

(continued)

Table 1. (continued)

Country Authors, and year	Insurance Type and Study Design	Primary Study Objective Relevant to the Review	Key Intervention(s)	Key Findings
Vietnam Wagstaff et al (2015)	SHI RCT Sample size: 3000 households	To assess the effectiveness of information and premium subsidies on participation in Vietnam's social health insurance program	Three interventions: an information leaflet about the insurance scheme and the benefits of health insurance, a voucher entitling eligible household members to 25% off their annual premium, and both.	1) The interventions all had small (of about 1 percentage point) and insignificant effects on enrollment. 2) Both the subsidy-only intervention and the combined intervention disproportionately drew individuals reporting sickness in the 12 months prior to the survey.
Mexico King et al (2009)	SHI RCT Sample size: 12284 health clusters	To experimentally assess Seguro Popular, program targeting 50 million uninsured individuals in Mexico	A campaign encouraging households to enroll in the insurance program. The intervention also included funds to participating states to upgrade medical facilities.	1) In the treatment clusters, 44% of households were affiliated to the insurance program, compared to 7% in the control clusters. 2) The intervention was more effective in poorer areas than in richer areas. However, it was not more effective in poor households relative to rich households.
Nicaragua Thornton et al (2010)	NHI RCT Sample size: 2608 individuals	To generate experimental evidence on the determinants of enrollment in a voluntary public health insurance program in Nicaragua, and the effects of insurance on healthcare expenditures, outcomes, and utilization among informal sector workers.	Three key interventions: (1) a brochure detailing the insurance available through the Nicaraguan Social Security Institute (NSSS), (2) a brochure accompanied by a 6-month insurance subsidy with instructions to sign up at the INSS office, and (3) a brochure accompanied by a 6-month insurance subsidy with instructions to sign up at a local microfinance institution.	Relative to individuals in the control group 1) Those in the informational brochure only group were 5 percentage points less likely to enroll. 2) Those in the brochure+subsidy+INSS arm were 33 percentage points more likely to enroll. 3) Those in the brochure+subsidy+MFI arm were 28 percentage points more likely to enroll.
Burkina Faso Oberländer (2014)	CBHI Sharp regression discontinuity Sample size: 12 058 households	To evaluate the impact of a premium subsidy on enrollment, out-of-pocket health expenditures, and incidence of lost days due to illness in a micro health insurance program in the Northwest region of Burkina Faso	A 50% premium subsidy offered to poor households identified by a community wealth ranking in 2007 (similar to the targeting exercise in Hillebrecht et al (2021)).	1) The subsidy increased enrollment in the insurance program by about 30 percentage points.
Burkina Faso Hillebrecht et al (2021)	SHI Fuzzy regression discontinuity Sample size: 1980 households	To estimate the price elasticity of demand for health insurance and associated selection effects in Burkina Faso	A 50% subsidy on the premium offered to the individuals in poorest quintile of households in each village and urban neighborhood (identified through a community-based targeting exercise in 2009), with no such subsidy for individuals in the remaining households	1) The subsidy more than tripled the enrollment of eligible urban households but was ineffective for rural households. 2) The subsidy disproportionately attracted households whose head was widowed and male, but at the individual level increased the uptake by the elderly, with no gender disparity in the uptake.



health insurance program. A year after the initial intervention, the researchers re-sent the enrollment kits and SMS reminders and extended the subsidy to those who had not enrolled. Half of the group was also offered “handholding”: in the endline interview, the enumerator offered to help complete the enrollment form, deliver it to the insurer’s office in the provincial capital, and mail the membership cards.<sup>26</sup> Wagstaff et al<sup>28</sup> (2016) conducted a similar experiment in Vietnam, where they offered households one of three interventions: an information leaflet about Vietnam’s government-run scheme and the benefits of health insurance, a voucher entitling eligible household members to 25% off their annual premium, or both.<sup>28</sup>

In Latin America, King et al<sup>24</sup> (2009) assessed the effect of a campaign encouraging households to enroll in Seguro Popular, Mexico’s insurance program, on catastrophic expenditures, medication spending, and health outcomes and utilization.<sup>24</sup> The intervention also included funds to participating states to upgrade medical facilities. Finally, Thornton et al (2010) offered different combinations of information, subsidy and enrollment location to informal workers in Nicaragua, and examined effects on out-of-pocket expenditure and healthcare utilization, among others.<sup>25</sup> Specifically, they randomized participants into one of three offers: a brochure detailing the insurance available through the Nicaraguan Social Security Institute (NSSS), a brochure accompanied by a 6-month insurance subsidy with instructions to sign up at the INSS office, or a brochure accompanied by a 6-month insurance subsidy with instructions to sign up at a local microfinance institution.

The two quasi-experimental studies, both from Burkina Faso, estimated the effect of a premium subsidy on insurance enrollment using a regression discontinuity (RD) design.<sup>18,19</sup> In early 2000s, the government of Burkina Faso provided a 50-percent subsidy on the insurance premium to poor households. The eligibility for the subsidy was determined by a community-based wealth ranking. The two studies compared insurance uptake among individuals on the two opposite sides of the eligibility cutoff in an RD framework.<sup>29</sup>

## Commonly Tested Strategies and Their Effectiveness

### *Educational Campaigns*

One of the two previous reviews identified the lack of understanding of how insurance works as one of the major barriers to enrollment in insurance programs.<sup>12</sup> Not surprisingly, 10 out of the 12 studies in our review tested some form of an educational intervention. In Table 2, we provide details of each educational intervention, covering the key approaches used, the content of the educational material, the medium of dissemination, the timing of the educational campaign in relation to when the insurance was offered, and whether the

study assessed the effect of the educational campaign on participants’ knowledge directly.

The most common education approaches were door-to-door campaigns and workshop-based group education. In both approaches, the participants were provided with information kits—primarily brochures and booklets—containing information about the insurance program, its premium and the benefit package, the registration procedure, and any applicable subsidies.<sup>20,23,25</sup> In most cases, the education materials were distributed by trained insurance agents who also answered questions from the potential enrollees. The information kits aimed to ensure that potential enrollees, including those with limited education, understood the principles of insurance. These kits utilized “easy to read text,” pictorial cues, and cartoons.<sup>21,23</sup> One study provided an extended training covering topics such as personal financial management, savings, risk management, and insurance.<sup>27</sup>

The timing and intensity of the educational campaigns differed across studies. In several studies, the offer to sign up for insurance was made concurrently with the provision of education, while in others education preceded the offer of enrollment—by a few weeks to a few months.<sup>21,22</sup> The most intensive education intervention was conducted in Burkina Faso, where researchers combined an informational brochure with a video tutorial and phone call reminders.<sup>17</sup> Other approaches to reinforcing education included follow-up visits by trained agents,<sup>20,21</sup> phone text reminders,<sup>26</sup> and the use of community leaders for enrolling individuals into insurance programs.<sup>23</sup>

Although an improved understanding of an insurance program is often required for individuals to enroll in the program, only two studies assessed whether the knowledge provided by the researchers increased recipients’ understanding of insurance principles and the health insurance product offered.<sup>17,20</sup> The remaining studies did not directly assess the effect of their education interventions on knowledge.

In terms of the effects on uptake, the majority of the studies found that education did not increase enrollment in insurance programs. Even in Burkina Faso, where a modest improvement in understanding of insurance principles was found among the participants, enrollment after 6 months was below 2%.<sup>17</sup> Based on this finding, Bocoum et al (2019) concluded that the demand for insurance enrollment was inelastic to information and that the lack of information was not a major barrier to the uptake of insurance in that context. In Nicaragua, those who received the information brochure were approximately five percentage points *less* likely to enroll in the insurance program than those in the control group who received nothing;<sup>25</sup> the information intervention worked in the opposite direction of what was expected.

The strongest effects of education were observed in Kenya, where information kits were disseminated via existing informal community groups such as cooperatives, clubs, and churches. This intervention capitalized on existing trust among individuals in informal social networks, reporting a

**Table 2.** Description of Studies that Used an Education Intervention.

Country Authors, and year	Content of the Education Intervention	Medium	Timing	Was Knowledge Assessed after the Intervention?
Burkina Faso Bocoum et al (2019)	A brochure explained the functioning of the health insurance program (e.g., how to subscribe, how to access services, and how co-payments worked). A video presented a short story putting the observer in the hypothetical situation of being ill under the two alternative scenarios—with and without insurance. Households received a personalized phone call reminding them to enroll in the insurance program.	The agents visited the selected households, explained the content and handed over the brochure, showed the video and provided additional explanations about the insurance and answered questions the households had.	Information on enrollment status was collected six months after the intervention. During the intervention, respondents were only asked about their intention to enroll.	Yes. The intervention led to a significant improvement in the knowledge of the principles of insurance.
Ghana Asuming (2013)	Education intervention provided basic information on the program including registration information, premiums and exemptions, and benefits of the scheme as well as general education on the importance of being insured.	Trained fieldworkers visited selected communities—twice, seven days apart and on different days of the week—to provide information and answer questions about the scheme.	Information on enrollment status was collected six months after the intervention.	Yes. Education significantly improved knowledge of all aspects of the NHIS.
Kenya Chemin (2018)	Brochure containing information about the program, including the concept of insurance (with a cartoon designed and piloted by community members), benefit package and assistance to register was given.	In study 1, local community members distributed informational kits. In study 2, field workers distributed the same kits as above in Rotating Saving and Credit Associations (34%), clan or family groups (23%), women's groups (15%), or church groups (9%).	Assistance with enrollment was provided at the same time as the intervention.	Yes. Information led to an increase in trust and knowledge of the product.
Senegal Bonan et al (2017)	Households were invited to attend a 3-hour educational presentation, which also had a lesson on personal financial management, covering savings and risk management.	Information session was held on a non-working day in the city center. Invitations were handed to heads of household.	The households were revisited 2–3 days after the literacy training.	No
India Das and Leino (2011)	The information and education campaign (IEC) materials covered key benefits of the government's insurance program, procedure for enrollment, and a phone number the potential enrolees could call with questions.	An organization with experience implementing community-based interventions in the area conducted the IEC. A letter was mailed to each treatment household as an introduction, followed with a home visit by a trained field officer. The field officer distributed a leaflet with text and pictorial cues covering the key benefits of the insurance program, the procedure for enrollment, and a helpline number. Posters were put up at ration shops and at sites such as the local flour mill where individuals were likely to congregate.	IEC was carried out two months prior to the effective start of a delayed enrollment process. The household survey was conducted immediately prior to and during the enrollment process.	No

*(continued)*



Table 2. (continued)

Country Authors, and year	Content of the Education Intervention	Medium	Timing	Was Knowledge Assessed after the Intervention?
Indonesia Banerjee et al (2021)	Three different types of basic insurance information were randomly advertised: the financial costs of a health episode and how they relate to insurance prices, the presence of a two-week waiting period from enrollment to coverage (so that one could not wait to get sick and immediately sign up), and the fact that insurance coverage was legally mandatory. All study households received basic information, such as what the insurance covered, the premiums, and the procedure for registration.	Households received a script and an accompanying booklet covering the information relevant (which depended on the intervention group the household was assigned to).	Offer to enroll was made at the time of the intervention.	No
Philippines Cupuno et al (2016)	Intervention households received information kit with a PhilHealth membership application form, a membership data record form, and leaflets covering enrollment, insurance claims and answers to frequently asked questions.	Informational kits were distributed by study team to individual homes. SMS reminders were sent by the study team at regular intervals to intervention households reminding them to submit their completed application forms and vouchers to a local PhilHealth office and to pay the balance on their premiums.	The delivery of informational kits and enrollment took place concurrently.	No
Vietnam Wagstaff et al (2015)	A leaflet explaining how to enroll, and listing the benefits of insurance. The leaflet had explanations of three areas: 1) that health insurance helps with healthcare expenses, 2) the cost of health insurance, 3) the enrollment process, and 4) the benefits of health insurance. The leaflet also indicated the names of the primary care facilities that the insured may use.	Leaflets	The informational kits and the offer to enroll were provided simultaneously.	No
Nicaragua Thornton et al (2010)	Insurance program brochure detailing the insurance product and the registration process.	Individuals received brochures following the randomization into arms.	Offer to enroll was provided simultaneously with the intervention.	No

12% increase in insurance uptake as a result of the intervention. The uptake sustained for a year.

Based on their study in Senegal, Bonan et al (2017) argued that the observed lack of the effect of education on insurance uptake may be explained by a number of factors, including the quality of

the education module or the participants' prior expectations about the insurance product. They argued that overly optimistic prior expectations may make insurance products less appealing once the details are known. This could also help explain the counterintuitive results reported in Thornton et al (2010).

The effect of education on enrollment may also depend on the *timing* of education, as Das and Leino (2011) showed in India. In their experiment, the education campaign, which was launched two months before the insurance policy was offered, had no effect on enrollment. However, households that were surveyed and therefore received information through the interviewers closer to the enrollment period were significantly more likely to enroll. Based on this finding, the authors suggest increasing information “dosage” (i.e., reinforcing earlier educational messages during subsequent visits for a survey) as a way to increase enrollment.<sup>21</sup> However, this finding on “dose–response” contradicts the finding by Bocoum et al (2019) in Burkina Faso, where a “repeated” engagement yielded only modest gains in knowledge about insurance and no improvement in uptake.<sup>17</sup>

### Subsidies

The provision of subsidies was the second most common intervention used to raise the uptake of insurance programs. Six out of the 10 RCTs and the two quasi-experimental studies tested the impact of subsidies on enrollment. The subsidies were provided to the potential enrollees predominantly in the form of a premium subsidy.

The amount of subsidy, frequency, and timing varied across studies. The amounts ranged from no subsidy to a 100-percent subsidy, with a 50-percent subsidy on the premium the most common. The intervention households in the Philippines study received a 50% premium subsidy in the first year of enrollment.<sup>26</sup> Those in the Kenya study received varying levels of subsidy (2%, 10%, and 30%), in addition to informational package and registration assistance.<sup>23</sup> The intervention households in Ghana received a full subsidy totaling GHC 12.20 (\$8.13), while those in Nicaragua received six-month insurance premium subsidy worth approximately US\$96.<sup>20,25</sup> As mentioned earlier, the two quasi-experiments from Burkina Faso were based on a 50-percent subsidy provided to poor households.<sup>18,19</sup>

Generally, the studies reported a positive effect of subsidies on enrollment. For example, in rural Burkina Faso, the 50-percent subsidies increased insurance uptake by approximately 30 percentage points.<sup>19</sup> The program in Indonesia offered time-limited subsidies—only available for two weeks after the offer was made. This unique feature was meant to resemble an insurance market where limited time period for enrollment is intended to safeguard against moral hazard.<sup>22</sup> In the study, a full subsidy increased enrollment by 18.6 percentage points, while a 50% subsidy increased enrollment by 10 percentage points.<sup>22</sup> These subsidies also attracted lower-cost individuals, thus reducing adverse selection—a common problem in health insurance markets.<sup>22</sup>

Previous studies focusing on other preventive health products such as deworming pills, use of insecticidal treated bed nets, vitamin supplements, water chlorine, and hand-washing soap have concluded that demand for these products

are highly price sensitive.<sup>30,31</sup> Dupas and Miguel (2017) have summarized the findings of these studies and provided a demand curve for these products (see Figure 2, page 46).<sup>32</sup> For comparability, in Figure 2, we show the demand curve for insurance programs based on information extracted from the studies in this review. The figure shows the relationship between insurance uptake expressed as a percentage (x-axis) and the effective price individuals face, also expressed as a percentage (x-axis). Consistent with the demand curves for other health products, the demand for insurance is sensitive to prices. Unfortunately, raw data on baseline premiums rates in these studies were not available for us to calculate the elasticities and compare them with those reported for other health products. It was also not possible to assess if there was a sharp dampening of demand when a positive price was charged (that is, going from a small subsidy to no subsidy), as small subsidies were uncommon in the included studies.

### Other Strategies

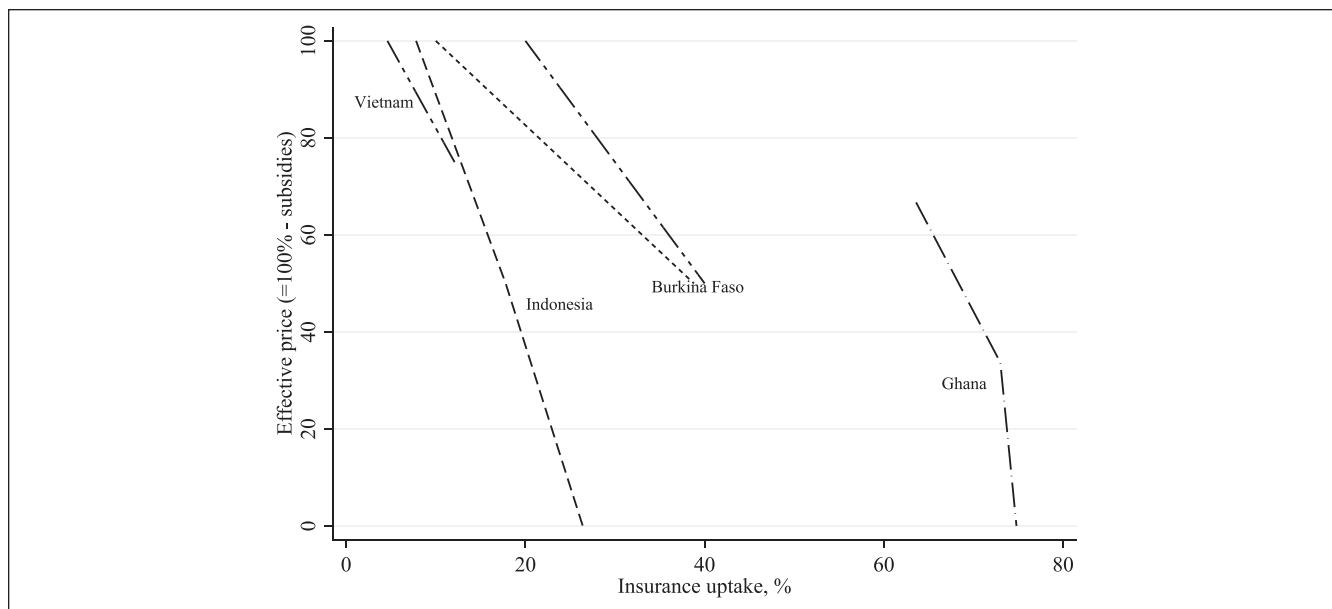
Apart from education and subsidies, several other strategies were used to improve enrollment in insurance programs, often in combination with education and subsidies. They included: (1) offering registration in the communities, thus making it more convenient to enroll;<sup>20,25</sup> (2) “handholding”—insurance agents helping enrollees to fill out and submit forms to central registration offices;<sup>22,23,26</sup> (3) using social networks for education and enrollment;<sup>23</sup> and (4) offering enrollment through local institutions such as micro-finance institutions.<sup>25</sup>

Evidence on the effectiveness of these approaches was mixed. For example, the decentralization strategy in which enrollment facilities were brought closer to the customers was effective in raising enrollment in Nicaragua and Indonesia, but had no effect in Ghana.<sup>20,22,25</sup> Relatedly, “handholding” raised enrollment by 29 percentage points in the Philippines, with a smaller effect among urban residents than among rural residents.<sup>26</sup> However, using community leaders to disseminate information, providing in-kind incentives (chickens) upon registration, or allowing payments from mobile platforms did not increase enrollment in Kenya.<sup>23</sup>

### Complementarity vs Substitutability Between Information and Subsidies

The question of whether subsidies and educational campaigns are complements or substitutes is of interest to policymakers.<sup>33,34</sup> If the two are complements, one bolsters the effect of the other, thus making the combined effect greater than the sum of individual interventions. Conversely, if they are substitutes, their effects may offset each other, thus reducing the benefits of implementing them together.

The studies that tested information and subsidies together suggested a strong complementarity between the two in some contexts but not in others. In the Philippines, the



**Figure 2.** Insurance uptakes rates by the level of subsidy.

*Notes.* The figure shows the effect of subsidies on the uptake of health insurance for the countries shown, taken from the studies included in the review. Effective price is calculated based on the subsidy provided (=100% minus the subsidy in percent).

combination of information and a 50% subsidy increased enrollment by five percentage points.<sup>26</sup> In contrast, the combined information-subsidy intervention had no effect in enrollment in Vietnam.<sup>28</sup>

The combination of education campaigns or subsidies with other “convenience tools” yielded mixed results. For example, combining a premium subsidy and personal phone reminders increased enrollment by 36 percentage points in the Philippines, but adding a convenience component (decentralization of registration offices) in Ghana had little to no additional effect on enrollment.<sup>20,26</sup>

### *Heterogeneous Effects Across Dimensions of Socio-Economic Status*

It is possible for the interventions described above to have different effects on different socio-economic groups, even within the same country. An understanding of these differential effects is important for effective targeting of future interventions. Five out of the 12 studies in this review examined heterogeneous effects of their interventions on enrollment.<sup>17,18,20,26,27</sup> The common dimensions across which heterogeneous effects were assessed include income, education, and rural vs urban.

The Burkina Faso and Ghana studies examined heterogeneous effects across income. In both studies, the effect of subsidies was stronger among poor households compared to their rich counterparts.<sup>17,20</sup> The differential effect was more pronounced when subsidies were combined with education.<sup>17</sup>

The Ghana and Senegal studies reported heterogeneity in effects across the education gradient. In Ghana, households

with an educated head were more responsive to the interventions, particularly the one that combined information and subsidies.<sup>20</sup> However, there was no differential impact of education on insurance uptake in Senegal.<sup>27</sup>

The Philippines study examined heterogeneity by urban versus rural residency. The effect of the main intervention (informational kit plus 50% premium subsidy) was 8 percentage points higher among the urban residents than among the rural residents.<sup>26</sup>

Hillebrecht et al (2021) showed that, in Burkina Faso, halving the insurance premium increased enrollment among poor urban residents by more than three times but was largely ineffective for rural residents.

### **Discussion and Conclusion**

Our scoping review included 10 RCTs and two quasi experimental studies from LMICs. We found that educational campaigns and subsidies were the two most common interventions that have been tested to increase enrollment in insurance programs in these countries, and that subsidies were generally effective in raising enrollment. This finding is consistent with evidence on other health products, where reducing subsidies—effectively raising the price—has been shown to dampen demand.<sup>35,36</sup>

Country-specific findings reported above should be understood in the context of that country’s economic status, the healthcare system, and existing health insurance programs and policies. These contexts have been discussed in detail elsewhere.<sup>37-47</sup> However, these countries have a number of common features. First, only a small percentage of the

population in these countries is covered by insurance programs. Second, these countries are experiencing a rapid surge in non-communicable diseases, which impose substantial financial burden to households in absence of health insurance.<sup>48</sup> A third common feature is the presence of a larger informal sector, which limits the share of the population that can be covered through employer-based insurance programs. The large informal sector also poses logistical challenges for collecting taxes and insurance premiums, as would be needed to fund the insurance programs.

While educational campaigns may be necessary in many LMICs given poor understanding of insurance principles in these settings,<sup>8</sup> the existing literature suggests that education alone is not sufficient to increase enrollment in insurance programs. Depending on the setting, this may be due to a range of factors, including limited decision-making power of those selected to receive the educational intervention (e.g., women) or simply the poor quality of the education provided.<sup>17,27</sup> Indeed, a prior review has shown that there are many determinants of enrollment in insurance programs in LMICs, including age, gender, educational attainment, location, household size, socio-economic status, and marital status.<sup>12</sup> Put differently, there may be several intertwined barriers--beyond the lack of education--to which the education programs may not have catered.

This review was restricted to experimental studies, which provided casual estimates of the effect of the intervention on insurance uptake and are less prone to methodological limitations than cross-sectional studies. Nonetheless, our study had a number of limitations. While we did a comprehensive database search for references, some studies may have been missed. Furthermore, we only included peer-reviewed publications in English; non-English sources and experiments that may have been reported in evaluation and technical reports of NGOs and development agencies have not been captured.

Despite these limitations, this review provides useful information for governments and development practitioners. The review suggests that governments aiming to raise enrollment in insurance programs should primarily consider ways to address financial barriers that individuals face. Policymakers need to strike a balance between maximizing access to services for the needy population and minimizing benefitting those who can afford insurance without any subsidy,<sup>32</sup> as large-scale subsidies are not feasible and sustainable in many LMICs.

Given the limited breakthrough with using conventional education campaigns and limited feasibility of subsidies, there is a critical need to test additional interventions. Of note, except for a few exceptions (e.g., Bonan et al, 2017; Thornton et al, 2010) studies have yet to capitalize on social institutions, such as trust within a network, to encourage the uptake of insurance. Socially organized informal groups such as churches, cooperatives, burial societies, and community clubs are ubiquitous in many LMICs, but their potential for changing health behavior—in this case, encouraging

enrollment in insurance programs—has been tested explicitly only in a few contexts.

Future experiments should examine whether the use of health information technology as used in high income countries can be adapted to LMICs.<sup>49</sup> While current efforts in high income countries—such as the possibility of enrolling for insurance online in the US—may appear ambitious in LMICs, mobile phones are now widely used in LMICs and have shown promise in a range of areas from raising adherence to antiretroviral therapy for HIV to promoting immunization. Such technologies can help tackle multiple barriers to the uptake of health insurance, ranging from inconvenience and transport costs to the lack of information.

Future studies can also explicitly test techniques from behavioral economics that have been utilized in other areas of health to alter behavior. Decisions about whether to enroll in an insurance program can be affected by a range of behavioral factors—including default and present biases. Relatedly, literature in public administration in high-income countries suggests that learning, psychological and compliance costs associated with interacting with the government can also deter individuals from utilizing government services.<sup>50</sup> The extent to which the education intervention in the studies included in this review catered to these factors is not clear.

Finally, in several LMICs, only expenses incurred at designated health facilities are covered by insurance programs.<sup>51</sup> In those cases, the uptake of insurance may depend on the quality of the services in participating health facilities. A few studies included in this review had interventions targeted to health facilities. However, to our knowledge, no study has examined the effect of the quality of care on the uptake of insurance.

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## Appendix I. Search Strategy

### Concept 1. Health Insurance

Key words/synonyms:

- health insurance programs, health insurance schemes, health financing, social protection programs

Mesh Terms “Insurance, Health”[Mesh] OR “Universal Health Insurance”[Mesh] OR “Community-Based Health Insurance”[Mesh] OR “National Health Programs”[Mesh]

“health insurance program\*”[tiab] OR “health insurance scheme\*”[tiab] OR “health financing” [tiab] OR “social protection program\*”[tiab] OR “Insurance, Health”[Mesh] OR “Universal Health Insurance”[Mesh] OR “Community-Based Health Insurance”[Mesh] OR “National Health Programs”[Mesh] OR “universal health insurance”[tiab] OR “national health program\*”[tiab] OR “community-based health insurance”[tiab]

### Concept 2. Enrolment

Key words/synonyms:

- Participation, uptake, utilization, registration, involvement, coverage expansion, scale up

No Mesh Terms:

participation\*[tiab] OR uptake\*[tiab] OR utilization\*[tiab] OR registration\*[tiab] OR involvement[tiab] OR “coverage expansion” [tiab] OR “scale up”[tiab]

### Concept 3. Experimental designs

Key words/synonyms:

- randomized control trials, experiments, quasi-experiments, causality, interventions

Mesh Terms “Research Design”[Mesh]



“randomized control trial\*” [tiab] OR experiment\*[tiab] OR “quasi experiment\*”[tiab] OR causality[tiab] OR interventions[tiab] OR “Research Design”[Mesh] OR “research design”

#### Concept 4. Low- and Middle-Income Countries

Key words/synonyms:

- low- and middle-income countries, developing countries

*Mesh Terms* “Developing Countries”[Mesh]

“low- and middle-income countr\*”[tiab] OR “developing countr\*”[tiab] OR “Developing Countries”[Mesh]

#### Below are the Search Strings Used for Each Database

##### PubMed

((“health insurance program\*”[Title/Abstract] OR “health insurance scheme\*”[Title/Abstract] OR “health financing”[Title/Abstract]) AND “social protection program\*”[Title/Abstract]) OR “insurance, health”[MeSH Terms] OR “Universal Health Insurance”[MeSH Terms] OR “Community-Based Health Insurance”[MeSH Terms] OR “National Health Programs”[MeSH Terms] OR (“participation\*”[Title/Abstract] OR “uptake\*”[Title/Abstract] OR “utilization\*”[Title/Abstract] OR “registration\*”[Title/Abstract] OR “involvement”[Title/Abstract] OR “coverage expansion”[Title/Abstract] OR “scale up”[Title/Abstract])) AND ((“randomized control trial\*”[Title/Abstract] OR “experiment\*”[Title/Abstract] OR “quasi experiment\*”[Title/Abstract]) AND (“low and middle income countr\*”[Title/Abstract] OR “developing countr\*”[Title/Abstract] OR “Developing Countries”[MeSH Terms])) AND 2000/01/01:2022/12/31[Date - Publication]

##### CINHAL

S2((MH “Randomized Controlled Trials”) OR (MH “Quasi-Experimental Studies”) OR “randomized control trial\* OR “experiment\*” OR “quasi-experiment\*” OR “causality” OR “intervention\*”) OR TI ((MH “Randomized Controlled Trials”) OR (MH “Quasi-Experimental Studies”) OR (MH “Causality”) OR “randomized control trial\* OR “experiment\*” OR “quasi-experiment\*” OR “causality” OR “intervention\*”) OR AB ((MH “Randomized Controlled Trials”) OR (MH “Quasi-Experimental Studies”) OR (MH “Causality”) OR “randomized control trial\* OR “experiment\*” OR “quasi-experiment\*” OR “causality” OR “intervention\*”) AND S4((MH “Low and Middle Income Countries”) OR (MH “Developing Countries”) OR “low and middle income country” OR “developing countr\*”) OR TI ((MH “Low and Middle Income Countries”) OR (MH “Developing Countries”) OR “low and middle income country” OR “developing countr\*”) OR AB ((MH “Low and

Middle Income Countries”) OR (MH “Developing Countries”) OR “low and middle income country” OR “developing countr\*”) AND S6((MH “Insurance, Health”) OR (MH “Community-Based Health Insurance”) OR (MH “National Health Programs”) OR (MH “Universal Health Care\*)) OR TI (“health insurance program\*” OR “health insurance scheme\*” OR “health financing” OR “social protection program\*” OR “health insurance” OR “community-based health insurance\*” OR “national health program\*” OR “universal health care” OR “universal health insurance”) OR AB (“health insurance program\*” OR “health insurance scheme\*” OR “health financing” OR “social protection program\*” OR “health insurance” OR “community-based health insurance\*” OR “national health program\*” OR “universal health care” OR “universal health insurance”)

##### PsychINFO

((MAINSUBJECT.EXACT(“Uninsured (Health Insurance)”) OR MAINSUBJECT.EXACT(“Underinsured (Health Insurance)”) OR “health insurance program\*” OR “health insurance scheme\*” OR “health financing” OR “social protection program\*” OR “health insurance” OR “community-based health insurance\*” OR “national health program\*” OR “universal health care” OR “universal health insurance”) OR (MAINSUBJECT.EXACT(“Uninsured (Health Insurance)”) OR MAINSUBJECT.EXACT(“Underinsured (Health Insurance)”) OR “health insurance program\*” OR “health insurance scheme\*” OR “health financing” OR “social protection program\*” OR “health insurance” OR “community-based health insurance\*” OR “national health program\*” OR “universal health care” OR “universal health insurance”))) AND (((MAINSUBJECT.EXACT(“Randomized Controlled Trials”) OR “randomized control trial\*” OR “quasi experiment\*” OR “experiment\*” OR “quasi-experiment\*” OR “causality” OR “intervention\*”) OR (MAINSUBJECT.EXACT(“Randomized Controlled Trials”) OR “randomized control trial\*” OR “quasi experiment\*” OR “experiment\*” OR “quasi-experiment\*” OR “causality” OR “intervention\*”))) AND (((MAINSUBJECT.EXACT(“Developing Countries”) OR “low and middle income countr\*”) OR (MAINSUBJECT.EXACT(“Developing Countries”) OR “low and middle income countr\*”)))

##### Google Scholar

(participation OR uptake OR utilization OR registration OR involvement OR “coverage expansion” OR scal\* up) AND (low- and middle-income country” OR “developing countr\*”) AND (“randomized controlled trial\*” OR “quasi-experiment\*”) AND (“health insurance program\*” OR “health insurance scheme\*” OR “health insurance” OR “national health program\*” OR “universal health insurance”)

## Appendix 2. Quality Assessment of the Studies Included in the Review

Study	Risk Assessment Parameter	Risk Level	Basis of Judgment	Overall Quality
Bocoum et al (2019)	Random sequence generation	Medium	Not specified	High
	Allocation concealment	Low	Treatment households randomly selected	
	Blinding of participants and personnel	Low	Treatment assigned at village level, except in one set of villages	
	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	
	Incomplete outcome data	Low	Attrition of 4.5%, but no evidence of differential attrition	
Hillebrecht et al (2021)	Selective reporting	Low	No evidence of selective outcome reporting	High
	Random sequence generation	N.A.	Quasi-experimental study design	
	Allocation concealment	Medium	Eligibility for subsidy determined in the village	
	Blinding of participants and personnel	Medium	Eligibility for treatment determined in the village	
	Blinding of outcome assessment	Low	Outcome measures preidentified before the study	
Oberländer (2014)	Incomplete outcome data	Low	Not reported	High
	Selective reporting	Low	No evidence of selective outcome reporting	
	Random sequence generation	N.A.	Quasi-experimental study design	
	Allocation concealment	Low	Eligibility for subsidy determined in the village	
	Blinding of participants and personnel	Medium	Not feasible due to nature of intervention	
Bonan et al (2017)	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	High
	Incomplete outcome data	Low	Not clear	
	Selective reporting	Low	No evidence of selective outcome reporting	
	Random sequence generation	Low	Random number generator used	
	Allocation concealment	Low	Treatments randomly assigned at the household level	
Capuno et al (2016)	Blinding of participants and personnel	Low	Small number of households selected from a large area	High
	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	
	Incomplete outcome data	Medium	Compliance rate was 58%	
	Selective reporting	Low	No evidence of selective outcome reporting	
	Random sequence generation	Low	Computer generated random numbers used	
	Allocation concealment	Low	Randomization at the municipality level	
Capuno et al (2016)	Blinding of participants and personnel	Low	Randomization at the municipality level	High
	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	
	Incomplete outcome data	Medium	Attrition rate not clear	
	Selective reporting	Low	No evidence of selective outcome reporting	

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Study	Risk Assessment Parameter	Risk Level	Basis of Judgment	Overall Quality
Chemin (2018)	Random sequence generation	Medium	Not specified	High
	Allocation concealment	Low	Households assigned to arms randomly	
	Blinding of participants and personnel	Medium	In some groups, staff provided info. and helped with registration	
	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	
	Incomplete outcome data	Low	No evidence of incomplete outcome data	
Asuming (2013)	Selective reporting	Low	No evidence of selective outcome reporting	High
	Random sequence generation	Medium	Not specified	
	Allocation concealment	Low	Randomization at community level	
	Blinding of participants and personnel	Low	Randomization at community level	
	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	
Das and Leino (2011)	Incomplete outcome data	Low	No evidence of incomplete outcome data	High
	Selective reporting	Low	No evidence of selective outcome reporting	
	Random sequence generation	Medium	Not specified	
	Allocation concealment	Low	Households randomized into interventions	
	Blinding of participants and personnel	Low	Only 3000 households received the intervention	
Thornton et al (2010)	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	High
	Incomplete outcome data	Low	Follow-up rates were above 90% across all groups	
	Selective reporting	Low	No evidence of selective outcome reporting	
	Random sequence generation	Low	Randomization was conducted using a lottery system	
	Allocation concealment	Low	Individuals randomized into intervention arms	
Wagstaff et al (2015)	Blinding of participants and personnel	Medium	Not specified	High
	Blinding of outcome assessment	Low	Outcome measures preidentified before the experiment	
	Incomplete outcome data	Low	Attrition rate between baseline and end surveys is just over 1%	
	Selective reporting	Low	No evidence of selective outcome reporting	
	Random sequence generation	Low	An online randomization tool was used	

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Study	Risk Assessment Parameter	Risk Level	Basis of Judgment	Overall Quality
King et al (2009)	Random sequence generation	Medium	Not specified	High
	Allocation concealment	Low	Matched pair cluster randomized experiment	
	Blinding of participants and personnel	Low	Randomization was at the health cluster level	
	Blinding of outcome assessment	Low	Expected results published before data analysis	
	Incomplete outcome data	Medium	Not clear if loss-to-follow-up was differential across arms	
Banerjee et al (2021)	Selective reporting	Low	No evidence of selective outcome reporting	High
	Random sequence generation	Low	Randomization conducted using CSPro (see trial registry)	
	Allocation concealment	Low	Randomization at household level	
	Blinding of participants and personnel	Low	Not specified	
	Blinding of outcome assessment	Low	Outcomes preidentified, and measured using administrative data	
Incomplete outcome data	Low	Some individuals could not be matched with govt. data, but the missingness was not differential across arms (footnote 14)		
	Selective reporting	Low	Trial was pre-registered	

Notes. The framework above is taken from Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ WV. *Cochrane Handbook for Systematic Reviews of Interventions Version 6.2*. 2021. The five risk assessment parameters are intended to capture the following types of bias: selection bias (in absence of random sequence generation and allocation concealment), performance bias (in absence of blinding of participants and research personnel, detection bias (in absence of pre-determined outcome), attrition bias, and reporting bias.