Unlocking Challenges of Universal Health Coverage in Haiti

A Dissertation

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Abstract

Unlocking Challenges of Universal Health Coverage in Haiti

A dissertation presented to the Faculty of the Heller School for
Social Policy and Management and the Graduate Faculty of Brandeis University
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By Marion Jane Cros

Haiti, located in the Latin America and Caribbean (LAC) region, has a human development index of 0.44, ranking 112 out of 157 countries (WDI, 2018). This means that a child born in Haiti today will be 45 percent as productive when she grows up as she could be if she enjoyed complete education and full health. More needs to be done in the health sector so that a child born in 2018 in Haiti has the capacity to reach her full potential by the time she enters the labor force. This dissertation investigates reasons behind the poor performance of Haiti's health sector, which impedes improvements in its human capital and providing Universal Health Coverage (UHC). UHC is a key part of the Sustainable Development Goals (SDG) and is monitored by the UHC service index coverage and rate of catastrophic health expenditure (CHE).

The first paper assesses inequalities in health service utilization and out-of-pocket payment (OOPP) for health using the 2012 and 2013 household surveys. The rate of CHE increased from 9.43% in 2012 to 11.54% in 2013, most particularly for the poorest (from 11.62% in 2012 to 18.20% in 2013), which also coincides with a sharp decrease in external funding. Econometric analysis demonstrates that wealth quintiles had a stronger influence on the

incidence of CHE in 2013 than in 2012, and that community outreach was pro-poor and protected households against CHE, while medicines were the key drivers of OOPP.

The second paper examines the role of health insurance on health service utilization and CHE rate using the 2013 household survey. The main finding is that households with health insurance are associated with higher health service utilization, but this also contributes to an increase in the CHE rate and undermines financial protection.

The third paper assesses the effect of community outreach activities on the number of institutional visits, using the 2014 Service Provision Assessment and routine information management data from 2016 to 2018. Main findings are that community productivity leads to better health facility production up to a point. But there is turning point by which having more community staff has a diminishing return for health facility production: nurses working at the community level will contribute to community productivity, but may spend less time at the facility, hence hindering the number of institutional visits.

As Haiti is about to review its National Health Strategy Plan, findings from the three papers suggest that Haiti may explore scaling up community outreach as a pro-poor policy. Additionally, better guidelines are needed to clarify the role of community and institutional staff with respect to community outreach to ensure facility production and service coverage is not affected. The Government of Haiti may also consider the feasibility of subsidizing the poorest to get health insurance to address adverse selection and poor financial protection. However, this requires reviewing the package of health services covered by the health insurance premium and making sure the latter addresses populations' needs, e.g., medicines, which is the main driver of OOPP in Haiti.

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1. Introduction

1.1. Policy relevance of Universal Health Coverage (UHC) for countries

Investments in health increase human capital and support a critical positive impact on economic development (Bloom 2003, Duncan and Frankenberg, 2002). In 2018, the World Bank (WB) developed a Human Capital Index (HCI) to raise awareness on the necessity of investing in all people through improved access to high quality and affordable nutrition, health care, inclusive education, vocational skills training and jobs to yield economic development (WB, 2018). Universal Health Coverage (UHC), defined in 2005 by the World Health Organization (WHO), is a recognized strategy to achieve better health outcomes (WHO, 2013) which in turn contribute to increased human capital and economic development. Access to equitable and affordable quality health care services and financial protection are critical to achieving UHC. The Sustainable Development Goal (SDG) 3.8, which aims to *"Achieve UHC, including financial risk protection, access to quality essential health care services and access to safe, effective, quality and affordable essential medicines and vaccines for all"* (WHO, 2019), provides a standardized mechanism to monitor health service utilization and financial protection in all countries.

In this three-paper dissertation, the author examines the drivers of inequal health service utilization and financial protection (Paper 1), the effect of health insurance on health service utilization and financial protection (Paper 2) and the role of community outreach on health facility performance in Haiti to explore the root causes of the slow progress in UHC. This

introduction presents background information on the health system and UHC challenges in Haiti followed by a summary of each paper.

1.2. Background: health system and UHC challenges in Haiti

Haiti, a Latin American and Caribbean (LAC) country, has an HCI of 0.44, ranking 112th out of 157 countries (WB, 2018). This ranking, the lowest in the western hemisphere, means that children born in Haiti today are projected to only achieve 45 percent of their life potential as productive citizens in comparison to their counterparts in other countries who have full access to education and health care (WB, 2018). Clearly, greater investments must be made to improve Haiti's health sector so that children born in the next decade and beyond can become labor-force ready and reach their full potential as active participants in society.

Following are four key challenges in Haiti's health sector that may contribute to the country's low HCI:

First, health outcomes and service coverage remain low in Haiti. Despite improvement in the maternal mortality ratio (MMR) (from 625 deaths per 100,000 live births in 1990 to 359 deaths per 100,000 live births in 2013 (Cavagnero et al, 2018), and a decline in under-five mortality rate (U5MR) (from 144 deaths per 1,000 births to 59 deaths per 1,000 births between 1994-1995 and 2016 (MSPP, 2000; IHE, 2018), health service delivery coverage remains severely limited and health outcomes have remained poor in comparison with other countries in the Latin America and Caribbean (LAC) region and other low-income countries (LIC) worldwide. The UHC Service Coverage Index (SCI), which measures the average coverage of essential health services, was 48 percent in Haiti in 2015, slightly higher than that of Sub-Saharan Africa (46 percent), but much lower than in the rest of the LAC region (75 percent) (WHO, 2017).

Second, within Haiti, sharp inequalities in health care service delivery and outcomes between the rich and the poor may be slowing down efforts to improve national health outcomes and coverage indicators. For example, in 2017 79 percent of pregnant women in the highest wealth quintile delivered at health facilities compared to 13 percent in the lowest wealth quintile. Similarly, vaccination rates were at 30 percent in the lowest wealth quintile compared to 66 percent among richer households (IHE, 2018). Globally, household out-of-pocket payments (OOPP) for health services, medicines and other medical supplies bought at points of service (POS) are widely recognized as a key factor discouraging the poorest wealth quintiles from seeking facility-based preventive and curative health care services (WHO, 2000; WHO, 2010; Wagstaff et al., 2018). Urrutia et al. (2012) report that Haiti reflects this same trend. For example, pregnant women did not use Traditional Birth Attendants (TBAs) or access facility-based health care services due to cost (Urrutia et al, 2012). The 2006 and 2012 Demographic Health Surveys (DHS) also underscore cost as a key factor in deterring women aged 15-49 years from consulting a health care provider when they are sick (MSPP, 2006; MSPP, 2012).

Third, a weak health care financing system (defined by low affordability, low budget allocation to health, high volatility of donor funding and limited efficiency in the use of resources) creates a complex and highly challenging environment for Haiti to achieve its goal of expanding UHC by 2030. For example, in 2015, international donors funded 49 percent of Haiti's total health expenditures (WHO, 2019), while individual households paid 41 percent of their total health expenditures. This figure far exceeds the 25 percent threshold for total health expenditures established by WHO to protect against financial hardship (WHO, 2010). The stagnation of Haiti's health budget allocation at 3 to 4 percent over the past 15 years (Cavagnero et al, 2018; WHO,

2019) has further burdened Haiti's health care financing system. Only 4 percent of health expenditures are funded through social security funds or other agencies (WHO, 2019), representing a minimal social safety net by any standard.

Finally, Haiti's health care providers lack capacity to deliver high quality and efficient services. An analysis of how efficiently health inputs (e.g., health staff) are converted into health care services reveals that Haiti has very low technical efficiency scores compared with other LICs (Hernandez and Sebastian 2013; Akzaili et al. 2008; Sebastian and Lemma 2010; Marshall and Flessa 2011; Kirigia and Asbu 2013; Osmani 2012). In ascending order, dispensaries are the most inefficient point of service, followed by other facility-based outlets, health centers without beds (Centres de Santé sans lit, CSLs), health centers with beds (Centres de Santé avec lit, CALs), and hospitals (Cavagnero et al., 2017).

1.3. Summary of the three papers examining root causes of slow progress of UHC in Haiti

This dissertation investigates modifiable and non-modifiable factors contributing to poor performance in Haiti's health sector and impeded progress towards its goal of achieving UHC by 2030. Modifiable factors include policies or mechanisms which can be adapted to unlock, address and improve the delivery and financing of health care services. Non-modifiable factors are fixed factors that cannot be changed, e.g., geography, facility type, ownership. Specifically, this dissertation examines both the supply and demand within the health sector.

This thesis is also addressing several research gaps, which will allow the Ministry of Public Health and Population and other international stakeholders to better understand the root causes of slow progress made on UHC: there is no estimate on catastrophic health expenditures (CHE) in Haiti and no research on the drivers of health-seeking behavior and CHE (study 1). Health

insurance is seen as a key health financing mechanism to provide access to health care services to all people in Haiti (MSPP, 2012), but there is also no evidence on its effect on health service utilization and CHE. Finally, there is no evidence on the effect of community outreach on health facility performance (study 3).

Paper #1 [Realization of the Right to Health in Haiti: How household data inform health seeking behavior and financial risk protection in 2012-2013] assesses inequalities in health service utilization and OOPP, while Paper #2 [The effect of health insurance on health-seeking behaviors and financial protection in 2013] examines the effect of health insurance on health service utilization and financial protection. Both papers offer recommendations to facilitate Haiti's objectives of reaching SDG 3.8.1 (financial protection) and SDG 3.8.2 (service coverage). Paper #3 [The effect of community outreach on health-facility production in Haiti, 2016-2018] tests the contribution of community outreach towards increasing facility-based consultations, a key consideration towards achieving UHC indicators of SDG 3.8.1 and SDG 3.8.2.

Paper 1: Realization of the Right to Health in Haiti: How household data inform health-seeking behavior and financial risk protection in 2012-2013

a) ***Background***: Paper #1 examined inequalities of health service utilization and OOPPs in Haiti to inform policy changes to address low utilization and high OOPPs, particularly for the poor. Beyond the disaggregation of health outcomes and service delivery coverage by income conducted by DHS, the only analysis of inequalities in access to health services and financial protection in Haiti exists within the 2017 World Bank (WB) Health Financing System Assessment (Cavagnero et al, 2017). The purpose of this WB assessment was to examine health care service utilization patterns among wealth quintiles through

descriptive statistics. Building on these existing findings, Paper #1 addresses existing research gaps by: 1) estimating inequality in outpatient services among all wealth quintiles, and 2) assessing the determinants of health service utilization and OOPPs for health at the national level.

b) ***Method*****:** Three types of analyses were conducted using the 2012 and 2013 Household Surveys[i] to measure: 1) outpatient services as a measure of inequalities using the 2013 Concentration Index (CI)[ii]; 2) drivers of health-seeking behavior using a logistic regression model with 2013 data; and 3) determinants of CHE using Seemingly Unrelated Regressions (SURs[iii]) for both survey years 2012 and 2013. CHE is defined by the SDG Framework (Indicator 3.8.2) as expenditures that exceed 10 percent of overall household expenditures.

c) ***Results****:* The rate of CHE increased nationwide among all wealth quintiles from 9.43 percent in 2012 to 11.54 percent in 2013. This increase was most pronounced among the poorest wealth quintile (from 11.62 percent in 2012 to 18.20 percent in 2013), while it declined among the richest wealth quintile (from 9.49 percent to 4.46 percent during the same period). The increased rate of CHE among the poorest coincides with a sharp decrease in external donor funding for the health sector. Regression analysis indicated that the rich quintiles were less likely than poor quintiles to incur CHE. Interestingly,

[i] Enquête sur les Conditions de Vie des Ménages Après Séisme (ECVMAS I and II). English translation is: "Survey of Living Conditions of Households After Earthquake"

[ii] The concentration index (CI) and related concentration curve (CC) quantify the degree of income-related inequality in a specific health variable.

[iii] SUR models were used to estimate the determinants of CHE based on 2012 and 2013 data from each survey year and by applying different explanatory variables. Compared to Ordinary Least Square (OLS), SUR allows dependent variables to have different sets of independent variables (Zellner, 1962; Green, 2012)

households were less likely to incur CHE by using Community Health Workers (CHW) than other types of providers. These findings are aligned with study results showing that CHW-provided services have a negative CI (-0.21) and are therefore most utilized by poor quintiles. In contrast, both public and private outpatient services had positive CIs (0.05 and 0.11, respectively) and are most utilized by the rich quintiles.

d) ***Conclusion and Policy Recommendations*:** The expansion of UHC in Haiti is evolving in a 'pro-rich' manner. Realizing Haiti's Right to Health will require a course correction supported by national policies that protect poor quintiles from CHE. Such policies may include expanded access to CHW service delivery in underserved areas. Evidence-based interventions (e.g., compulsory health insurance, equity funds at facility level) may also be required to lower outpatient user fees, subsidize drug costs and promote efficiencies in pro-poor disaster relief programming.

Paper 2: The effect of health insurance on health-seeking behaviors and financial protection in 2013

a) ***Background*:** Haiti has placed health insurance as a potential means of reform to improve financial access to health services (MSPP, 2012). Yet, little progress has been achieved over the last decade towards expanding coverage to those most in need. Between 2005 and 2015, the share of health care costs funded through social security funds or other agencies increased by only one percentage point, from 3 percent in 2005 to 4 percent in 2015 (GHED, 2018). Since 2015, l'Office d'Assurance Accidents du Travail, Maladie et Maternité[iv] (OFATMA) has been separately managing both private and public insurance

[iv] Office of Labor Accident, Sickness and Maternity Insurances

schemes (Saint-Albin 2015). Despite being a key policy in the Haitian National Health Plan (MSPP 2012), there is no evidence that the existing health insurance system on financial protection in Haiti has been effective. This paper addresses this evidence gap by assessing whether access to health insurance incentivizes households to seek care when needed, therein protecting the population (especially the poorest wealth quintiles) from CHE.

b) ***Method:*** This study utilizes the 2013 Haitian Households Surveys to test the effect of health insurance on health-seeking behaviors and financial protection. The author used a logit model with a propensity score matching (PSM) to examine the effect of health insurance on health service utilization and CHE. PSM was used to address the problem of having a low number of health insurance holders effecting the statistical power. PSM uses information from a pool of units that do not participate in the intervention (i.e., health insurance) to identify what would have happened to participating units (i.e., households) in the absence of health insurance (Austin, 2009), hence increasing the sample size and significance of results.

c) ***Results:*** Households with health insurance were eight times more likely to visit a health provider when sick ($P<0.001$,) controlling for socio-economic factors. PSM confirms the positive effect of health insurance on health service utilization, controlling for work status, wealth quintile, geography, number of children, and level of education. Compared to households with no HI, households with HI had a higher health service utilization by 14 percent (0.14, $P<0.02$). While health insurance was conducive to health seeking behavior, it had a positive relationship with CHE in the PSM model controlling for number of children, education, wealth quintile, work status, diseases, geography, age and household

size. Compared to households with no HI, households with HI had a higher rate of CHE by 15 percent (0.15; P<0.01). Study limitations include that three quarters of those with health insurance were rich. This may introduce a cofounding factor between effect of wealth and health insurance (HI). The fact that health insurance holders are sicker than those with no health insurance could be a sign of adverse selection (e.g., households purchase HI due to existing health pre-conditions).

d) ***Conclusion and Policy Recommendations:*** Despite its limitations, scale up of health insurance may be considered to promote health service utilization and improve UHC. The Ministry of Public Health and Population (MSPP) may consider the feasibility of subsidizing the poorest to access health insurance to address adverse selection and CHE. Moreover, the MSPP may also explore a study on the health insurance premium to better understand to which extent medicines, the main driver of OOPP (as seen in Paper 1), are covered by the existing OFATMA health insurance premium and propose recommendations to make sure the premium addresses the highest population's needs.

Paper 3: The effect of community outreach on health-facility production in Haiti, 2016-2018

a) **Background:** While Haiti has assessed the role of CHWs on services delivery at the community level (Ayoya et al, 2013; Jerome and Ivers, 2010), few studies have looked at the role of the community staff (CHWs but also community nurses and nurses' aides performing community outreach activities) on health facility production or total number of visits performed at facility level. Efficiency of health services in Haiti is low. Fewer than 5 percent of health facilities are using limited health resources in an efficient manner (Cavagnero et al. 2017; table 22). Examining the extent to which community staff

contributes to health facility production can provide useful policy recommendations to improve efficiency in the use of resources. This paper tests whether the Family Health Teams (FHT)[v] or community staff, proxy for community outreach programs, contribute to an increase in the number of visits at health facility level.

b) **Method:** This study used a mixed-method approach. The first model of the quantitative method assessed the effect of health workers working at community level (including CHWs as well as a proportion of nurses) on community productivity (measured by the log of non-institutional visits/total staff). The second model examined the effect of community productivity and the number of community staff on the number of institutional visits, controlling for modifiable factors (number of total staff and donor funding) and non-modifiable factors (management, facility type, geography). Both models use a pooled ordinary least squares (OLS) and random effect (RE) models. The data source is the routine health information management system or "systeme d'information sanitaire national unique" (SISNU) from 2016 to 2018 and the service provision assessment from 2013/14 (IHE, 2013). The qualitative method examined work environments of CHWs to better capture factors that increase CHWs productivity and show how this contributes to facility production.

c) **Results:** Community productivity led to better health facility production: a 10 percent increase in community productivity led to a 10 percent increase in health facility production or number of institutional visits ($P<0.001$). Community-based health care staff

[v] In Haiti, CHW is part of a broader primary health care approach, the family health team (FHT) which represents the first link in the chain of care. FHT are composed of CHW, one aide-nurses (AN) and one nurse managing the FHT, based at health- facility level (MSPP, 2017).

(nurses and CHW) improved community productivity by 26 percent (P<0.001) over time, demonstrating that community staff play an indirect role in health facility production. Given that community staff includes nurses and nurses' aides, the main finding is that there is a breaking point where having more community staff diminishes returns on investment for the health facility production. In other words, supervised nurses or other staff serving at community level will contribute to overall community productivity. However, by spending less time at the health facility, the number of institutional visits may decline.

d) **Conclusion and Policy Recommendations:** In a country like Haiti, it is necessary to scale up approaches such as community outreach programs that protect the poor against financial risk (Paper 1). However, improved guidelines are needed to clarify the role of community and institutional staff in community outreach initiatives. A stronger routine data collection system is needed to monitor the effect of time spent by CHWs and other institutional staff on community outreach and institutional productivity. An enabling work environment is crucial to maximize CHW productivity. Given the substantial cost of CHWs in Haiti (FHT guideline, 2017), monitoring this type of approach is crucial to help the MSPP assess the right balance of community and institutional staff to improve overall performance of health facilities.

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2. Paper 1: Equitable realization of the Right to Health in Haiti: How household data inform health-seeking behavior and financial risk protection

2.1. Background and conceptual framework

The connection between the Right to Health and Universal Health Coverage (UHC) is unequivocal. The World Health Organization (WHO) defines UHC as access to needed health services for all people while ensuring people do not suffer financial hardship when paying for health services (WHO, 2019). UHC has been termed as a "practical expression of the right to health"(WHO, 2019). The human rights-based approach sets clear principles for evaluating health policy and service delivery, targeting discriminatory practices and unjust power relations that perpetuate inequitable health outcomes (WHO, 2019). By prioritizing the health needs of the poorest, the right to health promotes greater health equity. This in turn supports developing nations in bridging the disparities between rich and poor populations' ability to access to quality health services, a central goal of the UHC agenda. The recent Sustainable Development Goal (SDG) Indicator 3.8.1 (related to population coverage) and SDG Indicator 3.8.2 (the financial dimension of UHC) are tracked by wealth quintile to ensure that the poorer are able to access better health coverage and better financial protection over time (WHO, 2017). Yet, achieving equitable health systems remains an arduous and allusive goal throughout the developing world.

In the Latin America and Caribbean (LAC) region which is marked by deep social inequalities, 18 countries have explicitly included constitutional Rights to Health (Yamin, 2015) as a means of setting the region on a path to achieving UHC.

Haiti, a country within the LAC region, grapples with a misalignment between the *de jure* Right to Health and *de facto* inequities that remain in practice. Though the Right to Health is included and defined in Haiti's constitution, and there is a renewed commitment to achieving UHC, Haiti has made little progress towards improving health coverage and health outcomes among its poorest wealth quintiles. Despite improvement in the maternal mortality ratio (MMR) (from 625 deaths per 100,000 live births in 1990 to 359 deaths per 100,000 live births in 2013 (Bank, 2017)), and a decline in under-five mortality rate (U5MR) (from 144 deaths per 1,000 births to 59 deaths per 1,000 births between 1994-1995 and 2016 (IHE, 2018)), Haiti continues to suffer some of the poorest health services coverage and outcomes when compared to other countries in the LAC region and other low-income countries (LIC) worldwide. The UHC Service Coverage Index (SCI), which measures the average coverage of essential services, was 48 percent in Haiti in 2015 (Bank, 2017), slightly higher than that of Sub-Saharan Africa (46 percent), but much lower than in the rest of LAC (75 percent) (WHO, 2017).

In Haiti, sharp inequalities in health care service delivery and outcomes between the rich and the poor may be slowing down efforts to improve national health outcomes and coverage indicators. For example, in 2017, 79 percent of pregnant women in the highest wealth quintile delivered at health facilities compared to 13 percent in the lowest wealth quintile. Similarly, vaccination rates were at 30 percent in the lowest wealth quintile compared to 66 percent among richer households (IHE, 2018). Globally, households' out of pocket (OOPP) payments for

health services, medicines or other medical supplies paid at the point of services are known to be a key factor in discouraging the poorest quintiles from seeking preventive and curative health care services at point of service outlets (WHO, 2019; WHO, 2010; Urrutia, 212). Urrutia et al. (2012) report that Haiti reflects this same trend. For example, pregnant women did not use traditional birth assistance (TBAs) or access facility-based health care services due to cost (Urrutia, 2012). The 2008 and 2012 Demographic Health Surveys (DHS) also underscore cost as a key factor in deterring women aged 15-49 years from consulting a health care provider when they are sick.

Lack of affordability is partly linked to the Haitian health care financing system, which is highly dependent on both external financing and user OOPP fees. For example, in 2015, international donors funded 49 percent of health expenditures (GHED, 2019), while individual households bore the burden of paying 41 percent of all health expenditures, a figure that far exceeds the 25 percent threshold established to protect against financial hardship (WHO, 2010). Additionally, only 4 percent of health expenditures are funded through social security funds or other agencies (GHED, 2019), representing a minimal social safety net by any standard. These factors create a complex and highly challenging environment in which Haiti is working to realize the right to health and expand health coverage for the poorest quintiles.

Despite ongoing advocacy for UHC, Haiti's health care financing model presents great challenges to expanding access to health care services among the country's most vulnerable populations. Any durable response will require gaining a better understanding of the distribution and root causes of inequality of health service utilization and OOPPs among all wealth quintiles. Beyond the disaggregation of health outcomes and service delivery coverage by income

conducted by DHS, the only analysis on inequalities in access to health services and financial protection in Haiti exists within the 2017 World Bank (WB) Health Financing System Assessment (Cavagnero, 2017). The purpose of this assessment was to examine health care service utilization patterns among wealth quintiles through descriptive statistics.

Building on this WB assessment, this study addresses existing research gaps by: 1) estimating inequality in outpatient services among all wealth quintile, and 2) assessing the determinants of health service utilization and OOPPs for health at the national level. Findings from this study may be utilized to establish evidence-based policies aimed at improving health service coverage and financial protection for Haiti's poorest wealth quintiles.

2.2. Methodology

2.2.1. Data source and sampling method

The primary data used to estimate morbidity, health service utilization and CHE rates were obtained from two surveys on living conditions in Haiti conducted in 2012 and 2013 (Enquête sur les Conditions de Vie des Ménages Après Séisme (ECVMAS I and II)) (International Household Survey Network, 2014). The 2012 survey, ECVMAS I, had a sample size of 4,930 households that was representative at the department and national levels (Ibid, 2014). The 2013 survey, ECVMAS II, was a panel survey with sample sizes of 2,282 households (of the ECVMAS I 4,930 sample), plus 10,887 individuals. The replacement rate was 8.86 percent. The 2013 ECVMAS II included a new module on health, detailed health expenditures and health-seeking behavior (consisting of 21 questions at the individual level)[vi].

[vi] The 2012 ECVMAS I survey did not include data on morbidity or health-seeking behavior.

Measurement of inequalities and inequities in outpatient service utilization by provider

This study focuses on outpatient service utilization by provider type, and does not examine inpatient data for the following two reasons: 1) Eight percent of the 2013 ECVMAS II sample measured outpatient services delivered by different types of providers, which allowed for a 'pro-poor ' assessment of outpatient services by provider type; 2) There were significant gaps in inpatient observation data in ECVMAS II, which constituted less than 3 percent of the survey sample.

This study utilized the Automated DEC Poverty Tables (ADePT) software developed by the WB (Lokshin, date unknown) to analyze inequalities between wealth quintiles in outpatient health services utilization. ADePT estimates CI following the procedures described by O'Donnell et al. for micro-data (O'Donnell, 2009). Inequalities are estimated as the transformation of a variable of interest (e.g., outpatient providers) on fractional rank of wealth within a given population. Outpatient services range from −1 to 1, representing an accurate distribution from pro-poor to pro-rich health care services.

A detailed decomposition of the CI for outpatient health care service utilization by provider type is presented in Table 5. In this analysis, we differentiate between inequities and inequalities as follows: Inequities refers to the disparity in rates due to differences in social, economic or healthcare resources (i.e., Is the distribution of resources fair?). These are unjustifiable determinants (e.g., wealth, education, health insurance status). In contrast, inequalities refer to how rates vary based on justifiable standardizing determinants such as age and gender (i.e., Can the distribution of outpatient services be influenced by demographic characteristics? (Lokshin, Klein et al., 2010)).

Measurement of catastrophic health expenditures (CHE) and health-seeking behaviors

Defined by the SDG Framework (Indicator 3.8.2) CHE refers to expenditures that exceed 10 percent of overall household expenditures using a methodology applied to monitor UHC financial protection (WHO, 2017). This indicator measures the rate of financial hardship incurred by OOPP health payments. This study defines CHE based on household consumption data (as the 2012 ECVMAS I did not collect income data). In addition, expenditure data is preferable to income data since it is more reliable and considered a better proxy of permanent income (Ravallion, 1994).

The numerator (total health expenditure) was estimated using survey questions on health spending in the consumption module in both ECVMAS I and II (rather than data collected in the health module in the case of ECVMAS II). This determination was made because respondents tend to report higher expenditures when questions about health expenditure are asked in a separate health module (Rannan-Eliya, 2008). Health expenditures (e.g., consultations, medicines, hospitalizations, lab work, glasses and prosthesis and other medical supplies) were captured if they were incurred during the 'last episode of illness'. Households were asked to estimate their expenditures over the previous three and twelve-month periods. Evidence showed that longer recall periods yielded lower average spending on an annualized basis (Beckett, 2001;Global Financing Facility, 2018). Taking into account this limitation, the author utilized data collected over the previous 3-month period to capture a more accurate measure of health expenditures.

The denominator was determined by the consumption aggregate created to measure poverty in Haiti (comprised of consumption and non-food expenditures, including health

expenditures). The author re-estimated the consumption aggregate to include all types of health expenditures, as the initial consumption aggregates only included recurrent health expenditures (i.e., consultations and medicines). Estimated CHE rates of both truncated and non-truncated data identified minimal differences (i.e., less than 0.5 percentage points) during both survey years.

A health-seeking behavior dummy variable[vii] was generated using a question that asked individuals whether they consulted a provider when they were sick over the last 3 months. Affirmative answers were coded as '1' and negative answers were coded as '0'. This variable reflected health service utilization.

2.2.2. Variables selection

Two regression models were utilized for this study. The first regression model examined the determinants of health service utilization in 2013, using the dummy variable for health utilization as a dependent variable. The second regression model identified the determinants of CHE in 2012 and 2013. The dependent variable was coded as 1 for CHE-affected households, and 0 for households not affected by CHE.

Based on a literature review of the determinants of CHE and health-seeking behaviors, the independent variables included geography and several household characteristics (e.g., expenditure quintile, household size, education and gender, and having at least one member

[vii] As indicated in data source and sampling, health seeking behavior questions were only reported in the 2013 ECVMAS II survey. This study therefore only analyzed the drivers of health seeking behavior for 2013.

older than 65 years or younger than 4 years). The CHE model also included data on provider type (i.e., public, private, CHWs and traditional healers) and health insurance. Considering OOPP for health services in the consumption aggregate implied that poor households with substantial health expenditures could shift to a "rich" consumption quintile, even though such expenditures would actually decrease their overall welfare and not make them richer (GFF, 2018).

The author used both 2012 and 2013 household surveys to estimate the rate of CHE, but only 2013 data was available to examine the determinants of health-seeking behaviors. The 2012 ECVMAS I did not include data on morbidity and health-seeking behavior, while the 2013 ECVMAS II examined these issues. National health expenditures in this study were estimated in Haitian Gourdes (HTG) and geographically geo-deflated[viii].

2.2.3. Statistical analyses

While health seeking behaviors were estimated at the individual level, the rate of CHE was estimated at the household level. The two regression models used a descriptive analysis to identify health utilization and CHE by consumption quintile. Logistic regression was used to predict determinants of health-seeking behaviors in 2013.

Model 1: Determinants of health service utilization[ix]

Health Utilization 2013 = β0 + β1 quint +β2 educ +β3 urb +β4 region +β5 gend + β6 hh_size +β7 kid<4+β8 old>65+ u1

[viii] In 2012, 1USD=42 Haitian Gourdes. In 2013, 1USD= 44 Haitian Gourdes (Exchange Rate, 2012; 2013)

[ix] as noted in model 1 in which "quint" stands for expenditure quintile, "educ", education (individuals who went to school are coded 1 and 0 otherwise), "urb" for urban (individuals who live in urban area are coded 1 and 0 otherwise), "region" (individuals who live in the North region are coded, 0; in the South, 1; in the Transversal region, 2; in the West, 3 and in the Metropolitan area, 4), "gend" for gender (women are coded 1 while men are coded 0), "hh_size", household size, "kid<4" (households with children below 4 years of age are coded 1 and 0 otherwise), "old>65"(households with member(s) above 65 years old are coded 1 and 0 otherwise).

SUR models were used to estimate the determinants of CHE based on 2012 and 2013 data from each survey year and by applying different explanatory variables. Compared to Ordinary Least Square (OLS), SUR allows dependent variables to have different sets of independent variables (Zellner, 1962; Greene, 2012). The SUR method estimates the parameter of all equations simultaneously, so that the parameters of each single equation also take into account information provided by the other equations. The relationship between these two equations with different independent variables is that the error terms in the two equations can correlate. As a result, SUR may produce more accurate estimates by combining information on different equations rather than running the models separately while allowing joint testing (Bhattacharya, 2004).

Two CHE equations (using 2012 and 2013 data) were utilized and run through the SUREG command in STATA 14 (IDRE, 2018). Both the 2012 and 2013 equations were predicted by socio-economic and demographic variables. The following health system variables only available for 2013 were included in the 2013 equation: health insurance, utilization of public and private health facilities, and utilization of CHWs, traditional healers and other ancillary services. Affirmative answers were coded as 1, negative answers were coded with 0. Joint tests utilizing 2012 and 2013 data were also conducted to assess how changes in socio-economic and demographic variables (e.g., wealth quintile, age and household size) effect CHE rates over time.

Model 2: Determinants of Catastrophic Health Expenditures

CHE 2012 = γ 0 + γ 1 quint + γ 2 educ + γ 3 urb + γ 4 region + γ 5 gend + γ 6 hh_size + γ 7 kid<4 + γ 8 old>65 + u1

CHE 2013 = γ0 + γ 1 quint + γ 2 educ + γ 3 urb + γ 4 region + γ 5 gend + γ 6 hh_size + γ 7kid<4+ γ 8 old>65 + γ9 public facilities + γ 10 private facilities + γ 11 CHW + γ 12 traditional healers + γ 13 other and ancillary services + γ 14 Health insurance+ u1

2.3. Results

2.3.1. Descriptive statistics

Socio-economic characteristics

Table 1 presents the summary statistics of extracted and computed variables from the 2012 ECVMAS I and 2013 ECVMAS II. The average household size is similar across the two years at 6.05 and 6.12, respectively. In each of the survey years, 51.54 percent and 49.60 percent of households, respectively, had at least one child under age four. One fifth of surveyed households in both years had an elder aged 65 or older. More than half of the surveyed households were headed by men (57.18 percent in 2012 and 55.51 percent in 2013), and slightly fewer than half of the households lived in urban areas. Almost two third of household heads were literate, with a slightly higher proportion in 2013 (65.89 percent) compared to 2012 (61.58 percent). The highest concentration of households was in the North, Transversal and the Metropolitan areas of the country. (Table 1).

Table 1. Descriptive statistics of Models 1 and 2, household level in Haitian Gourdes (HTG)[x]

	2012				2013			
Variable description	Obser-vation	Proportion	Mean	SD	Observation	Proportion	Mean	SD
Household level	4,930				2,241			
Household Expenditure	4,930		191,976	172,722	2,241		204,209	153,315
Catastrophic health expenditure	4,930		9.43%		2,241		11.54%	
Health OOP payment, HH level	4,930		8,091	28,632			19,630	178,073
Health OPP payment- Individual level	4,930		1,507	5,520			3,089	33,605
Household size	4,930		6.05	2.73			6.12	2.77
Household has under 4-years children	4,930	51.54%				49.60%		
Household has elderly	4,930	20.16%				20.69%		
Household head is male	4,930	57.18%				55.51%		
Household lives in urban area	4,930	47.97%				48.35%		
Literate household head	4,930	61.58%				65.89%		
Region								
North		20.62%				20.29%		
South		14.74%				13.55%		
Transversal		23.29%				24.73%		
West		19.32%				19.18%		
Metropolitan		22.02%				22.25%		
Households sick the last 30 days					2,241	18%		
Households who sought care when sick					2,241	76%		
Health Insurance					2,241	1.7%		
Households who used outpatient services					2,241	18%		
Households who used inpatient services					2,241	3%		

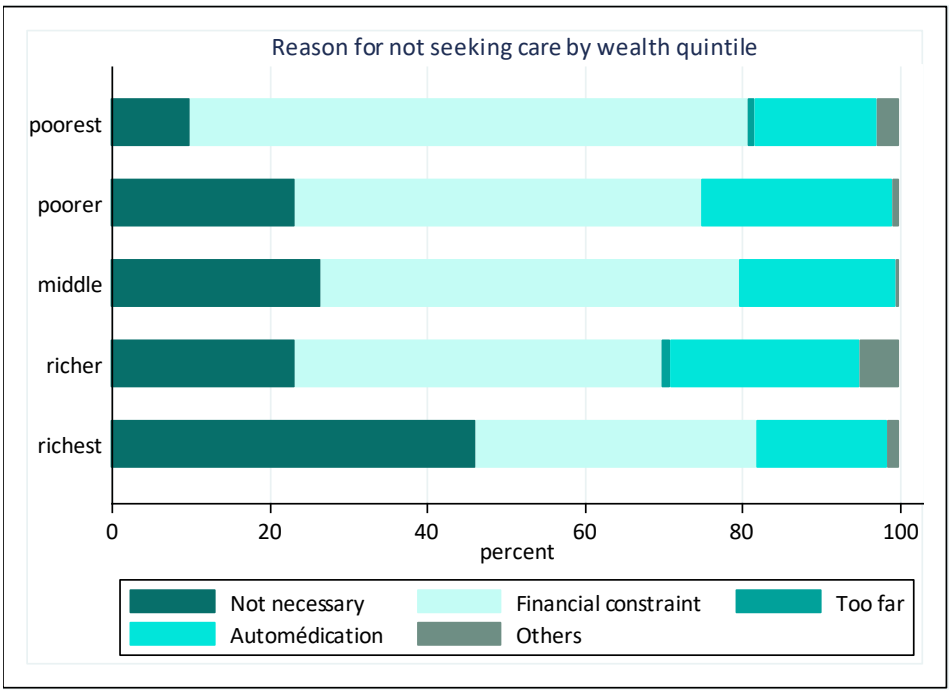
Source: ECVMAS I and II (2012 and 2013). Note: SD denotes standard deviation; OOPP denotes out-of-pocket payment; HH denotes households.

[x] In 2012, 1 USD $=42 Haitian Gourdes. In 2013, 1 USD $= 44 Haitian Gourdes

Health-Seeking Behaviors

According to the 2013 ECVMAS II, 18 percent of households sampled reported being sick in the previous 30 day; and 76 percent of these households reported having utilized health services during periods of sickness (Table 1). Twenty-four percent of households surveyed did not use health care services. Of these, 56 percent attributed their decision to the cost of health services (with a higher rate of 70 percent among poor households compared to 35 percent among rich households, (Figure 1)). When family members were sick, 31 percent of households accessed care through a public hospital, 20 percent through a public dispensary, 17 percent through a private provider, 12 percent through ancillary services (e.g., a pharmacist, drug sellers and laboratories), 7 percent through CHWs, 6 percent through a traditional healer and 5 percent through other service providers.

Figure 1. Reasons for not seeking health care by wealth quintile, 2013



Source: ECVMAS II 2013, estimated with wealth quintile net of OOPP for health at household level.

Health expenditures

The mean yearly household expenditure is HTG 191,976 in 2012 and slightly higher in 2013 with HTG 204,209 and the OOPP healthcare expenditure per household is HTG 8,091 in 2012 and HTG 19,630 in 2013 (Table 2). The proportion of households incurring CHE was 9.43 percent in 2012 and 11.54 percent in 2013. Since health expenditures have increased at a faster pace than total household expenditures between 2012 and 2013, OOPP for health as share of total household expenditures increased from 3.42 percent in 2012 to 4.46 percent in 2013 (Table 2).

Table 2. Household health expenditure characteristics by wealth quintile, 2012 and 2013

	Poorest	Poorer	Middle	Richer	Richest	Mean
2012						
Total household expenditures (THexp)	76,975 (70,425)[a]	126,883 (115,544)[a]	170,640 (158,897)[a]	219,003 (206,179)[a]	366,512 (296,538)[a]	191,976 (151,893)[a]
OOPP for health (in HTG)	3,978 (422)[a]	6,587 (1,112)[a]	5,693 (1,644)[a]	7,136 (2,056)[a]	17,066 (4,220)[a]	8,091 (1,390)[a]
OOPP health, % THexp	3.94%	3.64%	2.96%	2.9%	3.68%	3.42%
Catastrophic Health Expenditures, 10% THexp	11.62%	10.27%	8.50%	7.27%	9.49%	9.43%
2013						
THexp	97,090 (77,739)[a]	140,174 (134,005)[a]	187,095 (163,182)[a]	243,332 (220,968)[a]	353,562 (294,244)[a]	204,209 (165,993)[a]
OOP payment for health	58,864* (218)[a]	7,188 (495)[a]	10,203 (1,542)[a]	10,984 (2,379)[a]	10,778 (2,181)[a]	19,630 (1,329)[a]
OOP payment health, % of THexp	7.99%	4.09%	4.30%	3.38%	2.61%	4.46%
Catastrophic Health Expenditure, 10% THexp	18.20%	13.07%	13.52%	9.63%	4.49%	11.54%

[a] median; top OOPP spenders were 4 households within the lowest quintiles where they spent between HTG 91,000 – 1,077,000 on health care.

Comparison by wealth quintile shows that OOPP for health as a percentage of total household expenditures increased particularly among the poorest quintiles (from 3.94 percent

in 2012 to 7.99 percent in 2013), representing a sizable increase of 103 percent. In contrast, OOPP for health as a percentage of household expenditures decreased among the richest quintiles from 3.68 percent in 2012 to 2.61 percent in 2013 (-29 percent) (Table 3). The author notes that results for the poorest wealth quintile in 2013 are driven by four households who were the top OOPP spenders, spending between HTG 91,000 and 1,077,000 on health care. The median, in brackets, shows that 50 percent of the poorest households only spent HTG 218 per year, compared to HTG 2,181 of the richest households. Notably, households affected by CHE decreased by 57 percent in the poorest quintile (from 11.62 percent in 2012 to 18.20 percent in 2013), yet fell from 9.49 percent to 4.49 percent in the richest quintile.

Table 3. Percentage change in household health expenditures between 2012 and 2013

	Poorest	Poorer	Middle	Richer	Richest	Mean
Total Health Expenditures (THexp)	26%	10%	10%	11%	-4%	6%
OOP payment for health	1380%	9%	79%	54%	-37%	143%
OOP payment health, % of THexp	103%	12%	45%	17%	-29%	30%
Catastrophic Health Expenditures, 10% THexp	57%	27%	59%	32%	-53%	22%

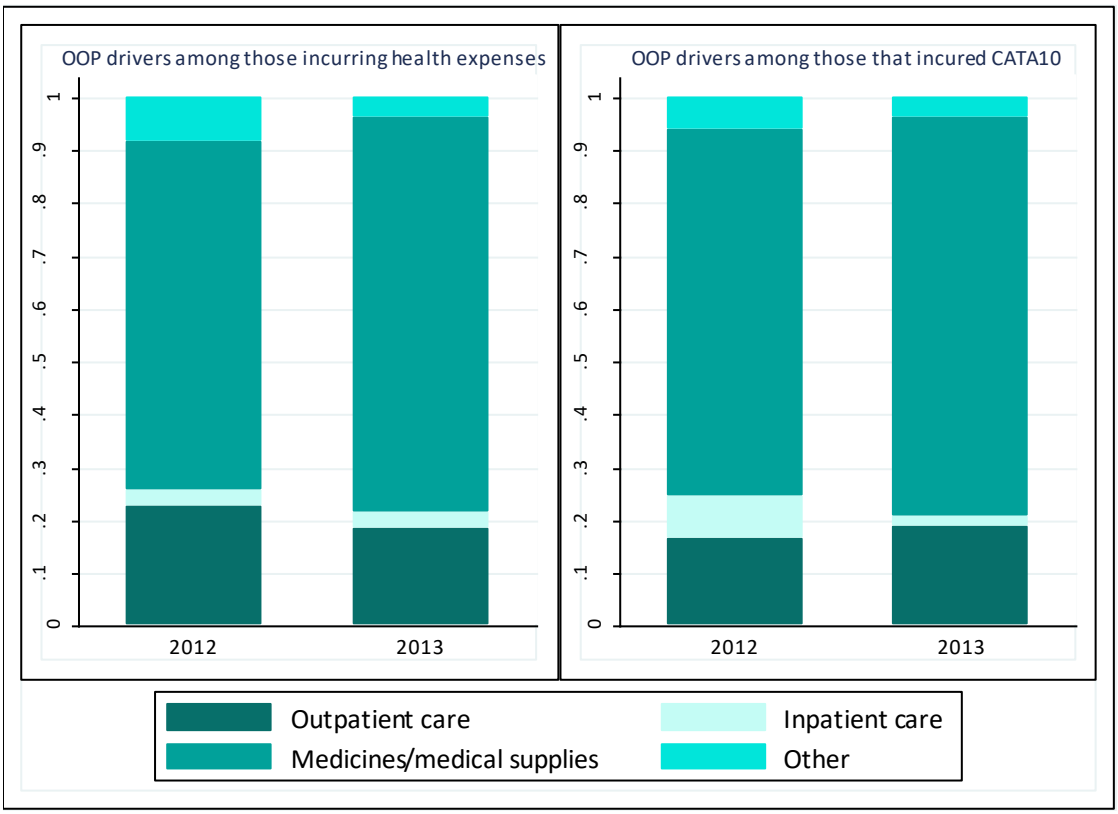
Source: ECVMAS 2012 & 2013

Drivers of health care spending

The author examined health expenditures by type. In both years, medicines and medical supplies were the key driver among households which incurred health expenditures and CHE. Medicines and medical supplies represented nearly 65 percent and 70 percent, respectively, of OOPP for health care services among households who incurred CHE in 2012. In comparison, these figures rose to 74 percent and 78 percent respectively in 2013 (Figure 2). Utilization of outpatient services was identified as an important driver of CHE (increasing from 16 percent in 2012 to 19

percent in 2013), while hospitalization services decreased from 10 percent to 1 percent over the same two years.

Figure 2. Drivers of health care spending, at the household level, 2012 and 2013



Source: ECVMAS I and II (2012 & 2013); CATA10 is CHE at 10% of household consumption

2.3.2. Econometrics analysis

Concentration Index and Curve

The author estimated the CI and curve for outpatient services. Overall outpatient services are close to the line of equality with a CI of 0.02 (Table 4). CHW and traditional healer were identified as pro-poor based on their negative CIs of -0.22 and -0.18, respectively. In contrast, private facilities were found to be pro-rich with a CI of 0.12, followed by ancillary services at 0.07 CI. Public facilities have a positive CI, but very close to 0 as well (with a CI of 0.05). A breakdown

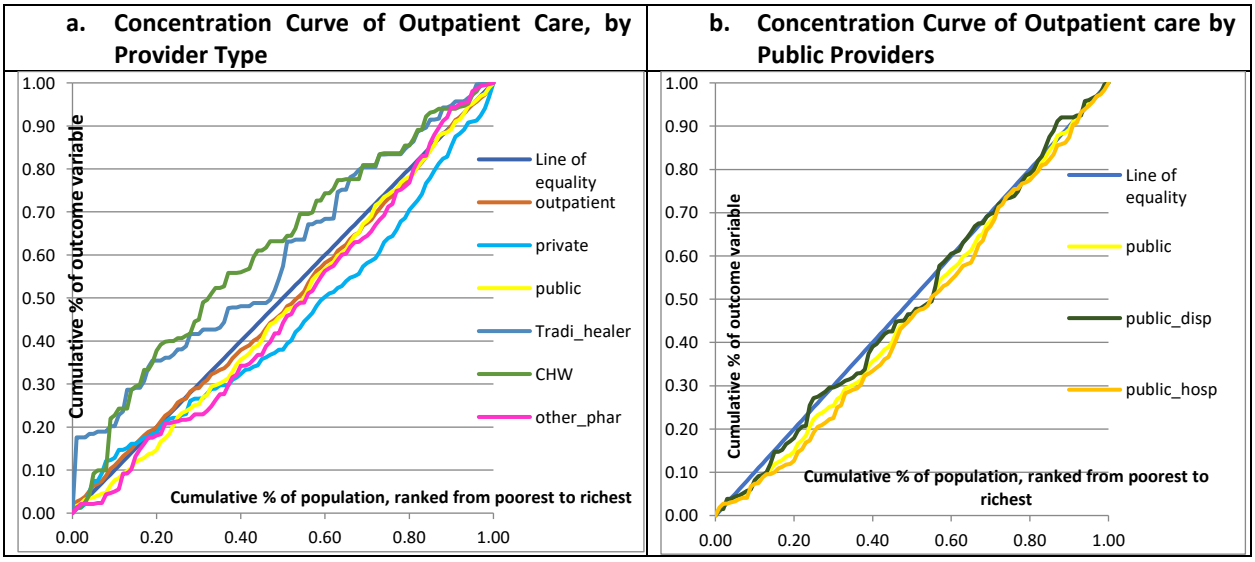
of health care utilization by public facilities, public dispensaries and public hospitals found that public dispensaries are more strongly associated with pro-poor characteristics (CI of 0.01) than public hospitals (CI of 0.08). CI results are presented graphically in Figure 3.

Table 4. Inequality of outpatient services, by provider type

	All health facilities (N=1,878)	Public health facilities (N=806)	Public Dispensaries (N=327)	Public Hospitals (N=479)	Private for-Profit facilities (N=472)	Ancillary Services (N=274)	Community Health Workers (N=112)	Traditional Healers (N=104)
Inequality or Concentration Index (CI)	0.02	0.05	0.01	0.08	0.12	0.07	-0.22	-0.18

Source: ECVMAS 2013 using ADePT software

Figure 3. Concentration curve of outpatient care



Source: ECVMAS 2013, using ADePT software

Decomposition of the Concentration Index

The decomposition of CI by provider types presented in Table 5 shows that CHWs and traditional healers are the only providers concentrated among the poor. Among poor wealth quintiles, use of CHWs is more concentrated than use of traditional healers. However due to affordability-related (wealth quintiles) factors and demand, poor households are more likely to

have small children, and parents of these children are more likely to seek care from CHWs. Traditional healers are also pro-poor, but this is mainly driven by availability (urban) and household size. The private sector is very pro-rich and driven primarily by affordability. Public providers trend towards being pro-rich as well, however households with more children below age four tend to shift the CI of public facilities towards being more pro-poor. The following variations by type of public facility were identified: While wealth quintile, household size and gender make the CI of public dispensaries and hospitals trending pro-rich, households with more children below age four and having any level of education off-set this effect, making the CI more pro-poor, especially for public dispensaries. This effect seems marginal for public hospitals which are much more pro-rich than public dispensaries.

Table 5. Decomposition of the Concentration Index

	All health facilities (N=1,878)	**Public health facilities (N=806)**	**Public Dispensaries (N=327)**	**Public Hospitals (N=479)**	**Private for Profit facilities (N=472)**	**Ancillary Services (N=274)**	**Community Health Workers (N=112)**	**Traditional Healers (N=104)**
Concentration index (Inequality)	0.02	0.05	0.02	0.08	0.12	0.07	-0.22	-0.18
Standardizing demographic variables								
Household size	0.02	0.02	0.03	0.00	-0.00	0.06	0.02	-0.04
Gender	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Older than 65	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
< 4 years	-0.03	-0.04	-0.07	-0.02	-0.01	-0.05	-0.07	-0.01
								Control variables
Wealth quintiles	0.07	0.08	0.07	0.09	0.13	0.14	-0.07	0.07
Educated	-0.09	-0.03	-0.03	-0.02	-0.02	-0.03	-0.03	-0.04
Health Insurance	0.01	0.01	0.01	0.01	0.01	-0.00	0.03	0.00
Urban	-0.02	-0.00	-0.02	0.01	0.01	-0.06	-0.10	-0.13
Residual	0.01	0.02	0.03	0.01	-0.00	0.01	-0.00	-0.03

Source: ECVMAS 2013, using ADePT software.

Methodological note: The decomposition of outpatient health services by provider type distinguishes the inequality measure from justifiable standardizing determinants such as age and gender- and unjustifiable determinants -the Z such as income, health insurance status. Each factor is drawn above or below zero– above 0 indicates a positive contribution of the factor making the CI more pro-rich and below 0 indicates a negative contribution of the factor making the concentration more pro-poor. The residuals show the part of the CI that is not due to the factors included in the analysis. In this study, gender and age and having children below 4 are seen as "need" variables that predict the need for health services, while wealth quintile, education, health insurance and residence as "non-need" variables, from which the differences of utilization resulted are considered as unfair and as inequity.

Determinants of Health-Seeking Behaviors

Econometric analysis confirmed the results of descriptive statistics, particularly in the area of socio-economic variables as key determinants of health care service utilization. As presented in Table 6, Individuals from the richest wealth quintile were three times more likely to use health care services when sick than were households from the poorest quintile (OR:3.07; P<0.001), controlling for other variables. Individuals in the fourth wealth quintile[xi] were more likely to seek health care by 79 percent (OR:1.79; P<0.01). Literacy also increased the likelihood of using health services by 63 percent (OR:1.63; P<0.001). In contrast, geographic variables (e.g., living in a specific region or in an urban area) had no effect on health seeking behavior (Table 6). Therefore, demographic factors are considered to only play a marginal role in predicting health seeking behavior. In contrast, having an additional household member increased the likelihood of seeking health care services by 9 percent (OR:1.09; P<0.05). Individuals with health insurance were eight times (OR: 8.12; P<0.001) more likely to consult a health care provider when sick. Regression results of the health seeking behavior model are presented in Table 6.

[xi] Consumption quintiles are used to distinguish population groups according to their economic welfare: poorest households are grouped together into the 1st quintile, those with higher consumption into the 2nd quintile, and so on. Five quintiles rank the population from the poorest 20% to the richest 20%. The purpose of wealth quintile designations is to analyze how social and economic indicators change in relation to a population group's welfare status.(30)

Table 6. Regression results of health-seeking behavior: Haiti, 2013 – individual level

	Odds Ratio (OR)	Std. Err	z	95% confidence Interval
Insurance (1=having insurance; 0=otherwise)	8.12***	4.82	3.52	1.40 – 9.45
Quintile (Poorest)				
Poorer	1.35	0.30	1.32	0.87-2.09
Middle	1.22	0.30	0.83	0.76-1.98
Richer	1.79**	0.46	2.28	1.09-2.95
Richest	3.07***	0.98	3.51	1.64-5.75
Having children < 4 y (yes=1; otherwise=0)	1.10	0.18	0.57	0.80-1.52
Having older > 65 y (yes=1; otherwise=0)	0.94	0.18	-0.33	0.64-1.370
Gender (1=women; 0=men)	1.09	0.19	0.51	0.78-1.55
Literate (1=literate; 0=otherwise)	1.63***	0.28	2.83	1.16-2.28
Urban (1=living in urban area; 0= rural area)	0.87	0.21	-0.56	0.54-1.40
Region (North)				
South	0.87	0.22	-0.52	0.53-1.45
Transversal	1.31	0.32	1.08	0.81-2.11
West	1.23	0.46	0.55	0.59-2.57
Metropolitan	0.63	0.18	-1.58	0.36-1.12
Household size	1.09*	0.04	2.26	1.01-1.17
Constant	0.85	0.30	-0.46	0.42-1.71

Pseudo R2:0.051; Number observation: 1,534; Wald-Chi2: 56.87; * p <0.05; ** p <0.01, *** p <0.001. Note: Std. Err. denotes standard error.

Determinants of Catastrophic Health Expenditures

The following paragraph describes results of the SUR model, including results of the chi square testing significance of variable differences over time (Table 7).

Wealth quintiles had a stronger influence on the rate of CHE in 2013 than in 2012. In 2012, the richest households were almost twice as likely not to face CHE compared to the poorest (OR:0.54; P<0.05), but were 5.6 times less likely to experience CHE in 2013 (OR:0.18; P <0.001). The values of coefficients of these two variables are significantly different between the two years (Table 7). While the fourth and middle wealth quintiles had a lower probability of facing CHE than the poorest (first wealth quintile) in 2012, the relationship was not significant. Holding all other variables constant, the fourth wealth quintile was 3.4 times less likely to face CHE compared to the poorest (OR:0.30; P<0.001), and the middle wealth quintile was 2.3 times less likely to face

CHE (OR: 0.42; P<0.05) in 2013. The values of coefficients of these two variables are significantly different between the two years. Poorer households (second wealth quintile) were less likely to incur CHE than the poorest (first wealth quintile) in 2012. This coefficient was not significant, yet became so in 2013 (OR: 0.59; P<0.05). Test results were found not to be significant for the "poorer" (second wealth quintile) over time. Having a household member aged 65 or older was found to increase the OR of encountering CHE, with a higher OR in 2013 (OR: 2.04, P<0.001) compared to 2012 (OR:1.47, P<0.05). However, the difference between the values of the coefficient over time was not found to be significant. Gender and having children aged four or younger was not found to influence the rate of CHE in both years. Household size was found to influence the rate of CHE in 2013, but not in 2012. The relative number of household members (i.e., smaller to larger) increased the odds of facing CHE by 18 percent in 2013 (OR;1.18; P<0.001) and the value of the coefficient of these two variables was found to be significant over time. Households living in urban areas faced slightly higher odds of CHE than households living in rural areas in 2013, but the coefficient of these two variables was not significant over time. Overall, geographic location did not influence the rate of CHE.

The SUR models indicated that across the health system, having health insurance increased the likelihood of incurring CHE by 2.5 (OR: 2.53; P<0.001) in 2013, holding all other variables constant. Surprisingly, households seeking care from public providers were almost four times more likely to incur CHE (OR:3.83; P<0.001), while households seeking care from private facilities were 10 times more likely to incur CHE (OR:10.45; P<0.001). In contrast, households seeking care from CHWs were 3.5 times less likely to incur CHE (OR:0.29; P<0.05). Households

going to traditional healers were more likely to incur CHE, but this relationship was not significant (Table 7).

Table 7. Results of the seemingly unrelated regression of CHE: Haiti, 2012, 2013, household Level

	2012		2013		Difference (2013-2012) Test (chi2)
	Odds Ratio (OR)	Standard Error (Std. Err)	OR	Standard Error (Std. Er)	
Quintile (Poorest)					
Poorer	0.77	0.164	0.59*	0.12	
Middle	0.83	0.183	0.42***	0.10	4.60*
Richer	0.72	0.181	0.30***	0.07	6.32*
Richest	*0.54	0.156	0.18***	0.06	6.01*
Having children < 4 y **(yes=1; otherwise=0)**	1.09	0.183	0.91	0.16	0.54
Literate **(1=literate; 0=otherwise)**	1.35	0.232	1.42*	0.25	0.04
Having older household > 65 y **(yes=1; otherwise=0)**	1.47*	0.257	2.04***	0.35	1.78
Gender **(1=women; 0=men)**	0.98	0.152	0.81	0.12	0.74
Household size	1.03	0.036	1.19***	0.04	9.30**
Region (North)					
South	1.54	0.38	1.25	0.31	0.34
Transversal	1.31	0.33	1.22	0.32	0.04
West	1.12	0.30	0.75	0.21	1.12
Metropolitan	0.95	0.24	1.19	0.31	0.37
Urban **(1=living in urban area; 0= rural area)**	1.04	0.22	1.19	0.25	0.19
Health system variables (2013)					
Health Insurance (yes=1; otherwise=0)			2.53*	1.19	
Public facilities (yes=1; otherwise=0)			3.83***	0.85	
Private facilities (yes=1; otherwise=0)			10.45***	2.47	
CHW (yes=1; otherwise=0)			0.29*	0.20	
Traditional Healer (yes=1; otherwise=0)			1.91	1.26	
Other and ancillary services (yes=1; otherwise=0)			1.08	0.53	
Constant	0.07	0.02	0.04	0.01	

Note: Each model had respectively 2,282 observations. * p <0.05; ** p <0.01, *** p <0.001. Note: Std Err denotes standard error

2.4. Discussion

This paper found out that the rate of CHE has increased between 2012 and 2013, particularly among the poorest wealth quintiles. The CI analysis underscored that public and private sector health services were not pro-rich, whereas CHW and traditional healers were pro-poor. The logit regression model on health seeking behavior in 2013 highlighted that individuals in the richest wealth quintile were three time more likely to use health services when sick than the poorest. Furthermore, SUR regression models on CHE in 2012 and 2013 found that wealth quintiles had a stronger influence on the rate of CHE in 2013 than in 2012. In 2012, the richest wealth quintile was almost twice as likely not to face CHE than the poorest wealth quintile but were 5.6 times less likely to experience CHE in 2013. This section discusses the outcomes of the CI analysis and regression models on health seeking behavior and CHE, both in Haiti and in comparison, with other low-income countries (LICs) and low- and middle-income countries (LMICs). The discussion section is divided into two sections: The first section discusses results from the CI analysis; and the second section examines findings on the drivers of health seeking behavior and CHE.

2.4.1. Concentration Index

In Haiti, the high rate of CHE among the poor could stem from the absence of a pro-poor health system. This finding is clearly illustrated in the CI analysis. Despite a low positive coefficient, public health facilities remain pro-rich (CI of 0.05) and are associated with CHE (OR:3.83; P<0.001). Inequities in access to health services at public facilities may be driven by

public hospitals which have the highest positive CI among public facilities (CI of 0.08). In contrast, CI among public dispensaries is close to 0 (CI of 0.02). Overall, the positive association between public facilities and CHE may be related to payments at points of service (e.g., outpatient user fees and drug-related costs) that all wealth quintiles, including the poor, incur on a continual basis. As shown earlier, outpatient user fees and the cost of medicines has been identified as a main driver of CHE in Haiti (Figure 2), reflecting similar trends throughout the LAC region and other LICs. For example, according to a 2018 study on financial protection looking at the drivers of CHE in LICs and LMIC countries, medicine costs are driving CHE in Guatemala, Sierra-Leone, Burkina-Faso, and Uganda, while outpatient user fees are a key driver of CHE in the context of outpatient care in Guinea, Bangladesh, and Liberia (GFF, 2018).

Unsurprisingly, private facilities are even more pro-rich than public facilities in Haiti and present an even greater risk to vulnerable populations of incurring CHE. This said, poorest quintile households continue to seek health care services at private facilities. Additional research is needed to better understand why poorest quintile households may be willing to risk accrual of significant personal debt in exchange for accessing privately provided health care services.

Results from the CI analysis in Haiti also mirror findings from other studies that have used the same methodology. A study on equity in health service utilization in Ghana, South African and Tanzania showed that both public and private health services were pro-rich (Mills et al., 2012). As in Haiti, public health facilities were found to be less pro-rich in the three countries than private facilities. Tanzania had similar results to Haiti in that the CI of public health facilities was close to the equality line, yet remained pro-rich. In contrast, the CI of public health facilities was much higher in Ghana and South-Africa than in Haiti. In a separate study, poor population

groups in Afghanistan used public facilities more frequently than wealthy populations who instead tended to use private facilities (Kim et al., 2016). Here the CI of public facilities was negative [-0.14] and truly pro-poor. In some countries, public hospitals were also less pro-poor than PHC facilities (Prinya et al., 2012).

In comparison to public and private health facilities, health care services provided by CHWs were found to be pro-poor in Haiti, with a negative CI of -0.22. Households consulting CHWs were 3.5 times less likely to incur CHE. The literature from other LICs shows that services provided through CHW has helped to expand the availability of health care coverage, while offering financial protections for the poor (WHO, 2019; Perry et al., 2014). Interestingly, seeking care from traditional healers was found to be pro-poor in Haiti (CI of -0.18), yet was also associated with higher CHE. Although this finding was not significant, it demonstrates a worrisome trend that the poor may be paying lot of money to tradition healers without the benefits and protections of quality control in delivery of these alternative services.

2.4.2. Determinants of CHE and health seeking behaviors

The reduction in CHE rates between 2012 and 2013 for the poor, and the fact that poor are three time less likely to consult health care services when sick than the rich, suggests a potential explanation behind low UHC tracer coverage across the lowest wealth quintiles (Institut Haïtien de l'Enfance (IHE), ICF International 2018)). Such findings confirm that the national health system poses ever-growing inequities for the poor.

The rate of CHE increased nationwide by 22 percent from 9.43 percent in 2012 to 11.54 percent in 2013, compared to an increase of 10 percent over a 10 year period throughout the

LAC region (i.e., from 13.4 percent in 2000 to 14.8 percent in 2010 (Wagstaff et al., 2018).The rate of CHE increase was most notable among the poorest wealth quintile with an increase of 57 percent from 11.62 percent in 2012 to 18.20 percent in 2013. In contrast, the rate of CHE declined by 53 percent among the richest wealth quintile from 9.49 percent to 4.46 percent during the same period. These results mirror previous research conducted throughout LICs in which poor households were found to be more vulnerable to CHE than rich households. A 2011 study on the determinants of CHE in 12 Latin American countries found that poor households incurred higher rates of CHE using a 30 percent threshold of total consumption (Knaul et al., 2011) than did rich households. A 2018 assessment of financial protection conducted by the Global Financing Facility (GFF) in 16 LICs and 8 low and middle-income countries (LMIC) found the rate of CHE by income quintile more concentrated among the poorest groups (GFF, 2018). A similar finding was observed in a 2017 assessment on CHE in LICs (Puteh et al., 2017). Similarly, findings from a study on the determinants of CHE in Nigeria in 2015 showed that CHE rates were three times higher among lower income groups than among richer income groups (Adisa, 2015). In Senegal, Séne and Cissé (2015) also used SUR to assess the determinants and magnitude of CHE impact. Predictably, findings showed that the risk of CHE jeopardized household welfare, particularly among the poor (Séne and Cissé, 2015).

National health accounts may give some insight as to the root causes of deteriorating financial protection for the poor between 2012 and 2013 (WHO, 2019). There was a significant increase in OOPP for health as share of current health expenditures, shifting from 31 percent in 2012 to 40 percent in 2013 (GHED, 2019). This increase coincides with a sharp reduction in external assistance, which decreased from 61 percent to 48 percent of current health

expenditures over the same time-period (GHED, 2019). In 2010, user fees were exempted across the Haiti, but were reinstated in 2013 to compensate for the decline in external donor funding. Indeed, the 2013 Service Provision Assessment (SPA) confirmed that 94 percent of health facilities had user fees in 2013 (IHE, ICF, 2014). Additionally, the observed increase in households' expenditures for medicines and medical supplies between 2012 and 2013 may be associated with decreased donor funding for the health sector (which includes disaster relief aid[xii]) over these same years and may have also contributed to increased rates of CHE.

Demographically, Haitian households with older members appear most vulnerable to financial fluctuations. This has also been observed in other LICs. For example, in Uganda households with elderly and unemployed family members were more likely to incur CHE (Puteh, 2017). Recognizing the cost of medicines as a key driver of OOPP, the author hypothesizes that older populations in this study may have incurred debt due to the costs of medicines needed to treat non-communicable diseases.

While health insurance was positively associated with health service utilization in Haiti, it was also associated with CHE and may therefore not be a viable solution for preventing financial hardship among the nation's poorest groups. Similarly, access to health insurance may also push households towards over-consumption of care without protecting them from financial hardship. Other LICs with health insurance have experienced similar deteriorations in CHE protections (Wagstaff et al., 2009). For example, the expansion of health insurance in the Philippines coincided with a worsening of financial protections for the poor because essential drugs were

xii Following the earthquake of 2010, external health expenditures jumped from 43 percent of current health expenditures in 2010 to 65 percent in 2011 (12). This additional external funding for the health sector addressed damage caused by the earthquake and had a strong focus on disaster relief aid.

excluded from the benefit package, resulting in a main driver of catastrophic spending (Bredenkamp, 2006). In the case of Haiti, national health insurance policies may also be a key driver of CHE because they do not adequately cover essential drugs. Additional research is needed to gain a better understanding of Haiti's health insurance benefits package and its correlation with CHE among vulnerable populations.

2.5. Study limitations

Limitations in this study present several threats to internal validity due to its design as a quasi-experiment study. The model examining the determinants of utilization of health care services is based on one data point (i.e., 2013), though there could be several factors effecting utilization of health services over time. Notwithstanding this limitation, the author offers this study as a point of departure, recognizing similar analyses may be conducted using the results of future household surveys. The health-seeking behavior model also has weak explanatory power (R^2 at 5 percent).

While financial barriers certainly pose an obstacle to accessing health services in Haiti, there are additional factors (e.g., cultural norms and traditions) which may also deter various populations from utilizing health services. Several qualitative studies have already highlighted the role of religion, voodoo, and other cultural factors in health-seeking behavior in Haiti. For example, a study examining the determinants of seeking care for mental health services in rural Haiti revealed that 32 percent of respondents selected God as their first choice of care, followed by clinics and hospitals (Wagenaar et al., 2013). While these considerations are important, the

introduction of cultural factors does not dilute the main conclusions about inequalities presented in this study.

The author recognizes that the absence of a control group in the study design introduces several limitations in the CHE model. Despite this gap, the author is confident of this study's findings, as the data sources and methodology remained consistent over the two-year period examined.

2.6. Conclusion and Policy Recommendations

By recognizing the Right to Health in Haiti's constitution and making UHC a core objective of the 2012 National Health Policy, Haiti has committed to realizing UHC through a pathway that is consistent with universally recognized tenants of human rights. Findings from this study show that Haiti's current approach to UHC expansion is being carried out in a pro-rich manner. Between 2012 and 2013, the rate of CHE among the wealthiest quintile decreased while increasing sharply among the poorest quintile.

Progress towards realizing the Right to Health in Haiti will require deliberate adjustments in national health care policies that incentivize health seeking behaviors while protecting the poorest quintiles from the risk of CHE. The author recognize that policy options are limited in a country such as Haiti due to highly constrained macro-economic conditions and low priority given to public health fiscal allocations (e.g., a decrease in per capita public health expenditures from USD $13 million in 2000 to USD $7 million in 2015 (Tandon A., et al, unpublished observations[xiii])). Yet donor funding from the international community continues to fuel a substantial share of

[xiii] Tandon, A. Cain, J. Kurowski, C. and Postolovska, I. (2018). Cross-Country Public Financing Dynamics: Fiscal Space Accounting for Health, Draft HNP Discussion Paper, World Bank, Washington, DC

Haiti's public health financing (i.e., 49 percent in 2015 (GHED, 2019)) and can be repositioned to prioritize pro-poor interventions.

Recognizing the resource, administrative and data constraints inherent in Haiti's health sector, the author offer the following pro-poor policy recommendations for the Government of Haiti and its health partners to consider. These recommendations prioritize interventions that would alleviate the burden of health care costs, while introducing sustainable incentives to increase health-seeking behaviors among Haiti's poor and marginalized populations.

1. **Expand access to Community Health Workers (CHW) in geographic areas with little to no existing coverage.** Given the pro-poor nature of health care services delivered by CHWs, expanded coverage would strengthen access to preventive health and promote a more robust referral system among poor households. Expanded CHW coverage would also lower the risk of CHE among vulnerable populations who would otherwise be deterred from seeking necessary care. To maximize resources and efficiencies, the strategic expansion of CHW services can be integrated into existing priority health care programming (e.g., cholera or malaria).
2. **Reduce the costs of medicines and medical supplies in public dispensaries, health centers and community hospitals through subsidies and more efficient supply chain management systems.** Approximately 70 percent of CHE is associated with the costs of medicines and medical supplies. Addressing this vulnerability through national policies that explicitly reduce the cost of these commodities is critical. This can be achieved through procurement policies that favor less expensive drugs and generics, and by increasing the availability of drugs in public health facilities and dispensaries where the

poorest tend to seek care. Reducing the cost of medicines and supplies through updated national procurement regulations, targeted pro-poor subsidies and prioritization of supply chain enhancements that minimize leakage of subsidized commodities will go a long way towards achieving more equitable and affordable access to health care among poor and vulnerable segments of the population.

3. **Reduce CHE by lowering user fees at outpatient points of service, especially in pro-poor public facilities and dispensaries through Haiti's Results-based Financing (RBF) program**. Initiated in 2016, Haiti's RBF program aims to improve service utilization and quality of care by providing financial incentives to facilities and providers at the primary care level based on performance (e.g., quantity and quantity of services provided). Reducing the rate of CHE may be achieved by introducing a user fee reduction policy within the RBF program currently being scaled up in more than 200 health facilities across the country. Since the RBF program operates at the primary care level (including public dispensaries), this type of policy would benefit poorer households.
4. **Explore a pro-poor reorientation to disaster relief programming.** Haiti is prone to national disasters. This study demonstrates that the poorest quintiles are disproportionately affected when external assistance is withdrawn. Future research should prioritize understanding the root causes of this phenomenon and suggest evidence-based interventions that can mitigate this inequity in a locally sustainable manner.
5. **Reexamine coverage offered in the existing health insurance package:** Existing health insurance mechanisms increase the rate of CHE. A reexamination of the types of services

covered by health insurance and drug reimbursement policies are warranted to improve coverage and reduce costs among Haitians. Given that health insurance is largely enjoyed only by rich wealth quintiles, expansion of health insurance coverage to poor wealth quintiles will be an important component in addressing overall health care inequities nationwide.

As demonstrated in the 2017 World Bank report (Cavagnero et al., 2013), there are several entry points within the Haitian health system where efficiencies may be gained. These include improved donor-government coordination in the area of annual resource allocations and public sector financial management reforms. These gains in efficiency may provide an important source of revenue that will be required to implement the recommendations offered in this study. While this and other potential sources of funding may be helpful, achieving the Right to Health for all Haitians will require the will to allocate financial resources and substantial political commitment at the highest levels of government and society.

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3. Paper 2: The effect of health insurance on health-seeking behavior and financial protection in 2013

3.1. Background

Ensuring equitable access to health services is a perennial challenge in all societies. To this end, the objective of national health policies in developing countries is to promote access to health care services for those in need, while minimizing health-related out-of-pocket payments (OOPP) for individual households. The objective of the Sustainable Development Goal (SDGs) is to *"Achieve Universal Health Coverage (UHC), including financial risk protection, access to quality essential health care services and access to safe, effective, quality and affordable essential medicines and vaccines for all"* (WHO, 2019). As such, SDGs provide an opportunity to countries to monitor for OOPPs, especially among the poorest wealth quintiles. The literature finds that protecting families from financial hardship requires having a subsidized health care system that limits clients' OOPPs at the point of service (WHO, 2017; Kawbata et al, 2002). Xu et al. (2003). The literature also demonstrates that countries with social insurance[14] schemes and tax-funded health systems are more able to protect households from catastrophic health expenditures

[14] "Social health insurance (SHI) is one of the possible organizational mechanisms for raising and pooling funds to finance health services, along with tax-financing, private health insurance, community insurance, and others. Typically in the more mature European SHI systems, working people and their employers, as well as the self-employed, pay contributions that cover a package of services available to the insurees and their dependents. In most cases they are obliged to make these contributions by law. Many governments also pay subsidies into these systems in order to ensure or improve their financial sustainability". WHO, 2010

(CHE)[15] (Chu et al., 2005; Oberman et al., 2006; Wagstaff et van Doorslaer, 2003; Limwattananon et al., 2007, Wagstaff, 2018).

Haiti, Long-burdened with political instability and recurrent natural disasters, has struggled to advance towards achieving its UHC targets[16]. As a share of overall health expenditures, OOPPs have decreased in Haiti from 46 percent in 2005 to 36 percent in 2015. Notwithstanding progress, this share remains 25 percent above the threshold needed to protect vulnerable populations from financial hardship (WHO, 2000). Haiti's high rate of OOPPs may also be the result of low levels of Government of Haiti (GoH) health expenditures[17] (e.g., stagnating at 11 percent between 2005-2015), and volatility in donor funding associated with various natural disasters and political crises in Haiti. The country's health financing system may have precipitated sharp inequalities between the rich and poor in terms of access to health care services. For example, in 2017 79 percent of pregnant women in the highest wealth quintile delivered at health facilities compared to 13 percent in the lowest wealth quintile (IHE, 2018). As another data point, Haiti's 2015 UHC Service Coverage Index[18] (SCI) was 48 percent (Bank, 2017), slightly higher than that of Sub-Saharan Africa (46 percent), but much lower than in the rest of Latin America and Caribbean (LAC) region (75 percent) (WHO, 2017). Socio-economic inequalities and disparities in

[15] Defined by the Sustainable Development Goal Framework (Indicator 3.8.2) as expenditures that exceed 10 percent of overall household expenditures.

[16]Despite improvement in the maternal mortality ratio (MMR) (from 625 deaths per 100,000 live births in 1990 to 359 deaths per 100,000 live births in 2013 and a decline in under-five mortality rate (U5MR) (from 144 deaths per 1,000 births to 59 deaths per 1,000 births between 1994-1995 and 2016 Haiti continues to suffer some of the poorest health services coverage and outcomes when compared to other countries in the LAC region and other low-income countries (LIC) worldwide (WHO, 2019; IHE, 2018).

[17] As share of current health expenditures.

[18] Developed by the world health organization in 2017, the SCI is used as a metric of UHC to measure the average coverage of essential services in a given country.

access to essential health services such as these are clearly impeding Haiti's efforts to reach its UHC objective.

The GoH has recognized that efforts to expand access to health insurance represent an important means of increasing affordability of health services for the people of Haiti, regardless of wealth quintile (MSPP, 2012). Yet, despite the government's commitment to UHC, little progress has been made over the last decade towards achieving this goal. Haiti's poor rely on a razor- thin safety net to protect them against health expenditures (e.g., in 2015, only 4 percent of current health expenditures was funded through social security funds or other agencies, an increase of merely 1 percent since 2005 (GHED, 2018).

The Office of Insurance for Work Accidents, Illness, and Maternity (Office d'Assurance Accidents du Travail, Maladie et Maternité, (OFATMA)) is Haiti's main health insurance institution which covers approximately 3-4 percent of the population (Cavagnero, 2017). OFATMAis an autonomous public institution under the administrative supervision of the Ministry of Social Affairs. Its mandate is to offer health insurance to four target populations: (1) Civil servants (88,000 individuals) and their dependents (approximately 440,000 assuming an average household of five); Until 2015, civil servants were covered in a separate scheme called *Groupe Santé Plus*; (2) Employees from private companies with at least 50 workers (though not all firms enroll their employees and the total number enrolled is not presently known); (3) Approximately 400 employees and their dependents from the 'informal sector' (e.g., 'Red Caps' who assist passengers at the airport) through a voluntary coverage scheme; and (4) Employees from the formal sector, also through a voluntary scheme. (Saint-Albin, 2015). OFATMA manages its delivery of health insurance to the four target populations through two consumer pools: a) civils

servants and b) a combination of employees from the formal and informal sectors[19]. In addition to OFATMA, Haiti has developed community health financing mechanisms. The most active of these mechanisms is called Development Activities and Services for Health ((DASH) (Développment des Activités de Santé en Haïti)), which operates throughout the country with healthcare facilities that belong to it in the metropolitan area of Port-au-Prince, in the city of Cap Haitien, on the Côte des Arcadins. DASH was created in 1985[20]. Finally, there are nine private and voluntary commercial health insurance entities in Haiti, yet little is known about their operations or catchment populations (Wright, 2015).

Health insurance is promoted as a key policy in the Haitian National Health Plan (Plan Directeur 2012-2022). Yet there is no evidence demonstrating whether or how well Haiti's existing health insurance system protects vulnerable populations from CHE. Using the 2013 household survey, this paper aims to address this research gap to assess: 1) whether Haiti's existing health insurance schemes[21] incentivize households to seek care when needed; and 2) whether access to health insurance program(s) can protect households (especially among poor wealth quintiles) from the devastating effects of CHE.

[19] Schemes 1 and 2 are compulsory while schemes 3 and 4 are voluntary.
[20] http://dashhaiti.org/index.php/historique/
[21] Data from the household survey do not allow us to determine the effect of one of the four health insurance schemes. In the survey, households replied they were enrolled in the civil servant scheme (GSP at the time of the survey, which was merged to OFATMA in 2015), a "mutuelle" which may be DASH and to a private scheme which may be outside OFATMA. Based on data, it is likely that households were mostly covered by OFATMA, DASH and private health insurance schemes.

3.2. Methodology

Using a post-test design with data from the 2013 Haiti Living Condition Survey, this paper examines the effect of having access to affordable health insurance on health-seeking behavior and protecting against CHE.

3.2.1. Data source and sampling method

The primary data used to estimate morbidity, health service utilization and CHE rates were obtained from two surveys on living conditions in Haiti conducted in 2012 and 2013 (Enquête sur les Conditions de Vie des Ménages Après Séisme (ECVMAS I-2012 and II-2013)) (IHI, 2014). The ECVMAS I had a sample size of 4,930 households and was representative at the regional (department in French) and national levels (Ibid, 2014). ECVMAS II was a panel survey with sample sizes of 2,282 households (e.g., a sub-set of the ECVMAS I sample) or10,887 individuals. The replacement rate was 8.86 percent. ECVMAS II included a new module consisting of detailed health expenditures and health-seeking behavior (consisting of 21 questions at the individual level)[22].

Measurement of health-seeking behaviors and catastrophic health expenditures (CHE)

As previously noted in paper #1 and in the introduction, CHE refers to health-related expenditures that exceed 10 percent of overall household expenditures and is used as an indicator to measure the rate of financial hardship incurred by OOPP health payments. This study uses household expenditure data to measure CHE, a data point known as a reliable proxy of permanent income (Ravallion, 1994). We estimated the numerator (total health expenditure) using survey questions on health spending in the consumption modules of both ECVMAS I and II.

[22] The 2012 ECVMAS I survey did not include data on morbidity or health-seeking behavior.

Data on health expenditures (e.g., fees for consultations, medicines, hospitalizations, lab work, glasses, prosthetics and other medical supplies) were captured only if they were incurred during the 'last episode of illnesses. Households were then asked to estimate their health expenditures over the previous three to twelve-month period. Evidence shows that when asked to recall expenditures over a longer period of time, respondents tend to report lower average annualized spending (Clarke et al, 2008, Beckett, 2001). Adjusting for this limitation, we utilized data collected over the previous 3-month period to produce a more accurate estimate of annual health expenditures per household.

The denominator for this work was determined by the 'consumption aggregate' created to measure poverty in Haiti (comprised of consumption and non-food expenditures, including health expenditures). In this paper, we have used an adjusted calculation to estimate the consumption aggregate so that all types of health expenditures could be included, instead of only recurrent health expenditures such as consultations and medicines. Estimated CHE rates of both truncated and non-truncated data identified minimal differences (i.e., less than 0.5 percentage points) during both survey years.

A health-seeking behavior dummy variable was generated using a question that asked individuals whether they had consulted a provider when they were sick during the past three months. Affirmative answers were coded as '1' and negative answers were coded as '0'. This variable reflected health service utilization.

3.2.2. Variables selection

This study used two regression models. The first model examined the effect of access to health insurance on health service utilization, using the dummy variable for health utilization as a dependent variable. The second model assessed the effect of access to health insurance on CHE. Both regression models used 2013 data from ECVMAS II. The dependent variable is the incidence of CHE. Households that experienced CHE were coded 1; households that did not experience CHE were coded 0. The treatment variable was health insurance. Households with health insurance were coded 1; households without health insurance were coded 0.

Based on a literature review on the effect of health insurance on CHE in LIC and LAC and health-seeking behaviors, the independent variables included geography and several household characteristics including expenditure quintile[23], household size, education, gender, employment status and having at least one member older than 65 years or younger than 4 years. Considering OOPP for health in the consumption aggregate implied that poor households with substantial health expenditures could shift to a "rich" consumption quintile, even though such expenditures are actually detrimental to their overall welfare and do not make them "richer"[24, 25]. Statistical analyses

This paper estimated health-seeking behaviors at an individual level and estimated the incidence of CHE at the household level. Logistic regression was used to predict the effect of

[23] In this study, expenditure, or consumption, quintiles are an estimate of net of OOPPs for health-related expenditures.
[24] National health expenditures in this study are estimated in Haitian Gourdes (HTG) and geographically geo-deflated. In 2012, 1USD=42 Haitian Gourdes. In 2013, 1USD= 44 Haitian Gourdes (USD to HTG exchange rate, 2019)
[25] In 2012, 1USD=42 Haitian Gourdes. In 2013, 1USD= 44 Haitian Gourdes (USD to HTG exchange rate, 2019)

access to health insurance on health-seeking behaviors using the following coding system to analyze variables:

Dependent Variables:

- Health utilization (health_utiliz): A health-seeking behavior dummy variable was generated using a question that asked individuals whether they had consulted a provider when they were sick during the past three months. Affirmative answers were coded as '1' and negative answers were coded as '0'.

Independent variables:

- Health insurance (HI): households with health insurance are coded 1, and households without health insurance are coded 0.
- Urban (urb): households are coded 1 and non-urban households are coded 0.
- Gender (gen): women are coded 1 and men are coded 0.
- Household size (hh_size); "any child" = households with a child under age 4 are coded 1 and households without children under age 4 are coded 0.
- (Any_old>65): households with a member over age 65 are coded 1 and households without a member over age 65 are coded 0.
- (any_educ): households with individuals who have any level of education are coded 1 and households with members who have no education are coded 0.
- (work): households with individuals who work are coded 1, households with individuals who are unemployed are coded 2, and households with individuals who are inactive (e.g., retired or disabled) are coded 3.

The second regression model is similarly configured except it does not include the health utilization variable given the dependent variable is CHE. It also analyses variables for disease-type. These include:

Dependent variables:

- Households that experienced CHE were coded 1; households that did not experience CHE were coded 0

Independent variables:

- Same as model 1 in addition to the following ones:
- Individuals with communicable diseases (CD) (i.e., fever, malaria, typhoid, cholera and diarrhea) are coded 1; individuals without communicable diseases are coded 0.
- Individuals with non-communicable diseases (NCD) (e.g., diabetes and hypertension) are coded 1; individuals without non-communicable diseases are coded 0.
- Individuals who consulted a doctor for specialty care (SC) (i.e., vision, dental and dermatological care) are coded 1; individuals who did not consult a doctor for specialty care are coded 0.

Model 1: Effect of health insurance on health service utilization
Health_Utiliz 2013 = β0 + β1 HI+ β2 quint +β3 Any_educ +β4 urb +β5 region +β6 gend + β7 hh_size +β8 Any Child+β9 Any_old>65+ β10 work+u1

Model 2: Effect of health insurance on catastrophic health expenditures
CHE2013 = β0 + β1 HI+ β2 quint +β3 Any_educ +β4 urb +β5 region +β6 gend + β7 hh_size +β8 Any Child+β9 Any_old>65+ β10 work+ β11 CD + β12 NCD + β13 SC +u1

One of the principal limitations of this paper is the low number of households with health insurance captured in ECVMAS II. This limitation could lead to weak statistical power and the results may not be significant. To address this potential weakness, this study utilized propensity score matching (PSM) techniques which uses information from a pool of units that do not participate in the intervention (i.e., health insurance) to identify what would have happened to participating units (i.e., households) in the absence of health insurance (Austin, 2009). By comparing how outcomes differ for participants relative to observationally similar non-participants, it is possible to estimate the effects of the intervention (Ibid, 2009). To achieve this comparison, the control group of households without health insurance must have similar characteristics to study group of households that do have health insurance. This comparison also assumes that the control group could have had the same means as the study group to enroll in a health insurance program thus increasing the sample size.

In this paper, PSM pairs households with health insurance along with households that do not have health insurance using all socio-economic characteristics available in ECVMAS II. Socio-economic characteristics for models 1 and 2 are first aligned, then we run again the regressions of models 1 and 2.

3.3. Theory

This study uses the Andersen Health Care Utilization Model (Andersen, Newman, 1973; Andersen 1995) to test the hypothesis that there are three key factors that lead to health service utilization: a) predisposition factors (e.g., race and age); b) enabling factors (e.g., family support

systems and access to health insurance); and c) needs (e.g., perceived and actual needs for health care services) (Andersen, 1995).

This hypothesis predicts that Haitian households will seek health care based on factors such as level of education, occupation, geographic location (e.g., rural/urban and district)[26], wealth quintile, household size, number of children under age 5, number of individuals older than 65 years, and enabling factors (e.g., access to health insurance and perceived need for health care services depending on the type of sickness such as communicable and non-communicable diseases and diseases requiring specialized medical care).

In Andersen's most updated conceptual framework (Andersen, 1995), the conceptual framework goes beyond health care utilization to health outcomes as the endpoint of interest. While financial protection is not a health outcome, it is an intermediate outcome that contributes to improved health outcomes. For instance, UHC aims to achieve improved health and development outcomes in line with the SDGs by monitoring the levels of CHE and financial protection (WHO, 2019). Similarly, the World Health Organization (WHO) (WHO, 2010) and others (Wagstaff et al. 2018) advocate for prepayment mechanisms to improve financial risk protections in order to achieve improved health outcomes. The Anderson (Andersen, 1995) health care utilization conceptual model could also be applied to predict financial protection and health care utilization using similar variables such as enabling factors (e.g., health insurance) and needs-related factors (e.g., various disease-types).

[26] "Département" in French

3.4. Results

3.4.1. Descriptive statistics

Socio-economic characteristics

Table 8 presents the summary statistics of extracted and computed variables from the 2012 ECVMAS I and 2013 ECVMAS II. The average household size is similar across the two years at 6.05 and 6.12, respectively. In each survey year, 51.54 percent and 49.60 percent of households, respectively, had at least one child under age four. One fifth of surveyed households in both years had an elder aged 65 or older. More than half of the surveyed households were headed by men (57.18 percent in 2012 and 55.51 percent in 2013), and slightly fewer than half of the households lived in urban areas. Almost two third of household heads were literate, with a slightly higher proportion in 2013 (65.89 percent) compared to 2012 (61.58 percent). The highest concentration of households was in the North, Transversal and the Metropolitan areas of the country (Table 8).

Table 8. Descriptive statistics of Models 1 and 2, household level

	2013			
Variable description	**Observations**	**Proportion**	**Mean**	**SD**
Household level	2,241			
Household expenditure	2,241		204,209	153,315
Catastrophic Health Expenditure Rate	2,241	11.54%		
Health OOPP, Household level			19,630	178,073
Health OPP-individual level			3,089	33,605
Household size			6.12	2.77
Household has under 4-years children		49.60%		
Household has elderly		20.69%		
Head of household is male		55.51%		
Household is located in urban area		48.35%		
Head of household is literate		65.89%		
Region				
North		20.29%		
South		13.55%		
Transversal		24.73%		
West		19.18%		
Metropolitan		22.25%		
Households with sick the last 30 days	2,241	18%		
Households who sought care when sick	2,241	76%		
Health insurance	2,241	1.7%		
Households who used outpatient services	2,241	18%		
Households who used inpatient services	2,241	3%		

Source: ECVMAS 2013. Notes: SD denotes standard deviation; OOPP denotes out of pocket.

Health-seeking Behaviors

According to the 2013 ECVMAS II, 18 percent of households sampled reported being sick in the previous 30 day; and 76 percent of these households reported having utilized health services during periods of sickness (Table 8). Twenty-four percent of households surveyed did not use health care services. Of these, 56 percent attributed their decision to the cost of health services (with a higher rate of 70 percent among poor households compared to 35 percent among rich households). When family members were sick, 31 percent of households accessed care through a public hospital, 20 percent through a public dispensary, 17 percent through a private

provider, 12 percent through ancillary services (e.g., a pharmacist, drug sellers and laboratories), 7 percent through Community Health Workers (CHW), 6 percent through traditional healers and 5 percent through other service providers.

Health expenditures and catastrophic health expenditures

In 2013, the mean yearly household health-related expenditure was Haitian Gourde (HTG) 204,209 and the average OOPP healthcare expenditure per household was HTG 19,630 (Tables 8 & 9). The proportion of households incurring CHE at 10 percent of household consumption was 11.54 percent. A comparison by wealth quintile shows that OOPP for health care services as a percentage of total household expenditures was higher among the poorest (18.20 percent in Quarter 1 (Q1) compared to 4.49 percent in Quarter 5 (Q5)). Importantly, the results for the poorest wealth quintile were driven by four top households who were the top OOPP spenders who spent between HTG 91,000 and 1,077,000 on health care. The median shows that 50 percent of the poorest wealth quintile households only spent HTG 218 per year compared to HTG 2,181 for the richest wealth quintile households.

Table 9. Household health expenditures by wealth quintile, household level, 2012 and 2013

	Poorest	Poorer	Middle	Richer	Richest	Mean
THexp	97,090 (77,739)[a]	140,174 (134,005)[a]	187,095 (163,182)[a]	243,332 (220,968)[a]	353,562 (294,244)[a]	204,209 (165,993)[a]
OOPP for health	58,864* (218)[a]	7,188 (495)[a]	10,203 (1,542)[a]	10,984 (2,379)[a]	10,778 (2,181)[a]	19,630 (1,329)[a]
OOPP health, % of THexp	7.99%	4.09%	4.30%	3.38%	2.61%	4.46%
CHE, 10% THexp	18.20%	13.07%	13.52%	9.63%	4.49%	11.54%

[a]median; *top OOPP spenders were 4 households within the lowest quintiles where they spent between HTG 91,000 – 1,077,000 on health care. Notes: OOPP denotes out of pocket; CHE denotes catastrophic health expenditure.

Characteristics of health insurance holders for the PSM models

Of the ECVMAS II sample size of 10,887 individuals (or 2,243 households), 171 individuals (1.6 percent of the sample) reported having health insurance. Among the 171 individuals with health insurance, 24 percent had a *Mutuelle de Santé* (community-based health insurance, voluntary), 32 percent had an insurance from *Groupe Plus (GSP*) (health insurance available to civil servants[27]), and 44 percent had health insurance through a private health insurance company. Of the 1,664 individuals who reported a sickness, 3.6 percent had health insurance. Of the 1,285 individuals who sought health care services due to illness, 4.2 percent had health insurance (either of the three types noted above).

Descriptive statistics indicate the following characteristics of health insurance holders: Almost three quarters of health insurance holders were rich (belonging to wealth quintiles 4 and 5), 20 percent belonged to the middle wealth quintile (wealth quintile 3), and 8 percent were poor, belonging to wealth quintile 2[28](Table 10). Among households with health insurance, 45 percent were employed, 9 percent unemployed and 14 percent were inactive (e.g., retired or disabled). Among households with health insurance, 70 percent lived in an urban area, 30 percent lived in a rural area, and 84 percent had any level of education. Half of individuals with health insurance were children aged 4 or younger, and 16 percent were 65 years old or older. Among households with health insurance who consulted a provider during an illness, 27 percent did so for communicable diseases, 12 percent for non-communicable diseases (e.g., diabetes and hypertension), 9 percent for specialized care, and 4 percent for child birth.

[27] Households enrolled in GSP are civil servants and became part of OFATMA in December 2015.
[28] Among the lowest wealth quintile, no households reported having health insurance.

Table 10. Characteristics of individuals with health insurance

	Total Population (N=10,887)	Health Insurance holders (N=171)
	1.6%	100%
Households who went to see a doctor when sick	4.28%	91%
Wealth quintiles		
Poor	0.5%	8%
Middle	1.5%	20%
Richer	2.0%	25%
Richest	4.2%	47%
Work Status		
Employed	1.7%	**45%**
Unemployed	1.1%	9%
Non-Active	1%	14%
Others	1.4%	31%
Geography		
Urban	2%	**70%**
Rural	1%	30%
Region		
North	0	0%
South	0	0%
Transversal	2.12%	22%
West	1.21	12%
Metropolitan	3.16%	**65%**
Any Children < 4 years of age		
1	1.6%	**50%**
0	1.6%	50%
Any elder> 65 years		
1	1.2%	16%
0	1.65%	**84%**
Any education		
1	2%	**84%**
0	0.68%	16%
Diseases		
1. Communicable (Fever, malaria, cholera, typhoïde)	3%	**27%**
2. Specialized care (skin, eye care, dental)	4.2%	9%
3. Diabetes/HTA	5.1%	12%
4. Birth of a child	4.1%	4%
5. Others	4.2%	**47%**

Source: ECVMAS, 2013. Notes: HTA denotes hypertension.

3.4.2. Econometrics analysis

Regression result of health-seeking behavior model

Households in the richest wealth quintile were three time more likely to use health services when sick than the poorest wealth quintile (Odds ratio (OR):3.11; P<0.001), controlling for other variables. Households belonging in the next to richest (richer) wealth quintile were 83 percent (OR:1.83; P<0.05) more likely to seek health care than the poorest wealth quintile. Having any level of education also increased a household's likelihood of using health services by 61 percent (OR:1.61; P<0.01). In terms of geographic variables, living in a specific region or in an urban area had no effect on health-seeking behaviors. Demographic factors play a marginal role in health-seeking behavior. Nevertheless, having an additional household member (this is the household size variable) increases the likelihood of seeking health care services by 9 percent (OR:1.09; P<0.05). Households with health insurance were almost eight times (OR: 7.91; P<0.001) more likely to consult a health care provider when sick than those without health insurance.

Table 11. Regression results of health-seeking behavior: Haiti, 2013 – individual level

	Odds Ratio (OR)	Std. Err	z	95% conf Interval
Insurance (1=having insurance; 0=not having insurance)	7.91***	4.72	3.46	2.45 – 25.50
Quintile (Poorest)				
Poorer	1.32	0.29	1.27	0.85-2.05
Middle	1.23	0.31	0.84	0.75-2.02
Richer	1.83*	0.47	2.32	1.09-3.06
Richest	3.11***	1.00	3.53	1.65-5.84
Having children < 4 years (yes=1; no children < 4=0)	1.06	0.17	0.38	0.76-1.48
Having older > 65 years (yes=1; otherwise=0)	0.92	0.18	-0.37	0.63-1.36
Woman (1=woman; 0=man)	0.90	0.15	-0.60	0.63-1.26
Any education (1=literate; 0=not literate)	1.61**	0.27	2.77	1.14-2.26
Urban (1=living in urban area; 0= rural area)	0.87	0.21	-0.53	0.54-1.42
Region (North)				
South	0.87	0.22	-0.52	0.53-1.45
Transversal	1.31	0.32	1.12	0.81-2.12
West	1.21	0.45	0.52	0.58-2.53
Metropolitan	0.65	0.19	-1.46	0.36-1.15
Household size	1.09*	0.04	2.36	1.01-1.17
Labor				
Employed	0.79	0.17	-1.00	0.51-1.24
Unemployed	0.65	0.19	-1.46	0.36-1.15
Inactive (Retired or Disabled)	1.01	0.25	0.06	0.61-1.67
Constant	1.04	0.43	0.10	0.42-2.34

Pseudo R^2:0.054; Number of observations: 1,534; Wald-Chi2: 57.86; * p <0.05; ** p <0.01, *** p <0.001.
Notes: Std err denotes standard error; CI denotes confidence interval.

We first looked for a match sample of health insurance holders, running a model with all socio-economic characteristics included in the initial regression result of Model 1 (Table 11). However, the propensity score was not balanced[29]. The model was subsequently run again with the following socio-economic characteristics: any children, any level of education, wealth quintile, urban and work status (Table 12). These variables were balanced which ensured a similar

[29] The covariate balance created by the PSM method allows unbiased estimates of the treatment effect. Subclassifying or matching on estimated propensity scores can create balance on many observed covariates, simultaneously leading to unbiased treatment effect estimates (Pattanayaka, 2011).

mean propensity score in both the sample group with insurance and the control group with no insurance. A regression of model 1 was run again with the sample and control groups (Table 13) which confirmed the previous finding: having access to health insurance influenced health service utilization (0.14, P<0.001). Households with health insurance had higher health service utilization rates than households without health insurance by 14 percent.

Table 12. Estimate of the propensity score – regression of the treatment with independent variables

insurance	Coefficient	Std. Err.	z	95% Conf. interval
Urban (1=living in urban area; 0= rural area)	0.11	0.07	1.46	(0.04)- 0.25
Any children < 4 years (yes=1; otherwise=0)	0.18*	0.07	2.50	0.04-0.31
Any education (1=literate; 0=otherwise)	0.15	0.09	1.70	(0.02)-0.32
Poor wealth quintile	(0.16)	0.19	(0.84)	(0.53)-0.21
Middle wealth quintile	0.50 ***	0.14	3.50	0.22 – 0.77
Rich wealth quintile	0.59***	0.14	4.17	0.31 – 0.87
Richest wealth quintile	0.94***	0.14	6.61	0.66 - 1.22
Employed	0.12	0.08	1.59	(0.03) – 0.28
Unemployed	(0.18)	0.12	(1.50)	(0.42) – 0.05
Inactive (Retired or Disabled)	(0.17)	0.10	(1.76)	(0.37) – 0.02
Constant	(2.92)	0.15	(19.95)	(3.21) – (2.63)

Pseudo R^2:0.093; Number of observations: 10,709; Wald-Chi2: 57.86; * p <0.05; ** p <0.01, *** p <0.001. Notes: std err denotes standard error; conf interval denotes confidence interval.

Table 13. Effect of health insurance on health-seeking behavior after propensity score matching (PSM)

Health Service Utilization	Coef	Standard Error	z	[95% conf Interval]
Health insurance (1 vs 0)	0.14***	0.02	5.76	0.09-0.19

Number of observations: 1,690; * p <0.05; ** p <0.01, *** p <0.001. Notes: Coef denotes coefficient; conf interval denotes confidence interval.

Regression results of the catastrophic health expenditures model

Households in the richest wealth quintile were three times less likely to face CHE during an illness than the poorest wealth quintile (OR:0.30; P<0.01), controlling for all other variables. Households in the next-to-richest wealth quintile (richer) were 2.38 times less likely to incur CHE than the poorest wealth quintile (OR:0.42; P<0.01), controlling for all other variables. Having a household member older than 65 years old increased the likelihood of a household facing CHE by 82 percent (OR:1.82; P<0.05). Geographically, living in a specific region or in an urban area had no effect on the risk of incurring CHE. Having an additional household member increased the likelihood of incurring CHE by 17 percent (OR:1.17; P<0.05). Households with health insurance were 2 times more likely to incur CHE, but this finding was not significant (Table 14). Households with an employed head of household were 1.78 less likely to incur CHE than households with inactive (e.g., retired or disabled) heads, controlling for all other variables (OR: 0.56; P<0.05). Households with an employed head of household were three times less likely to incur CHE than households with inactive heads of household (OR:0.33: P<0.01).

While coefficients for the three disease-types (communicable, non-communicable, and illnesses requiring specialized care) were positive, none was significant (Table 14).

Table 14. Logit results of catastrophic health expenditures: Haiti, 2013 – household level

	Odds Ratio	Std. Err.	z	95% Conf.interval
Insurance (1=having HI; 0=otherwise)	2.30	1.30	1.47	0.76 – 6.99
quintile (Poorer)				
Middle	0.62	0.18	(1.68)	0.35 - 1.08
Rich	0.42**	0.12	(3.09)	0.24 - 0.73
Richest	0.30**	0.13	(2.88)	0.13 – 0.68
Having children < 4 years (yes=1; otherwise=0)	1.05	0.24	0.23	0.67 – 1.65
Having older > 65 years (yes=1; otherwise=0)	1.82*	0.49	2.23	1.08 – 3.06
Woman (1=woman; 0=man)	0.95	0.24	(0.20)	0.59 – 1.55
Literate (1=literate; 0=otherwise)	1.14	0.27	0.57	0.72 – 1.80
Urban (1=living in urban area; 0= rural area)	1.43	0.47	1.09	0.75 – 2.72
Region (North)				
South	1.04	0.40	0.10	0.49 -2.21
Transversal	1.51	0.54	1.15	0.75 – 3.06
West	1.49	0.64	0.94	0.65 – 3.45
Metropolitan	1.20	0.43	0.51	0.60 – 2.41
Household size	1.17*	0.05	4.03	1.09 – 1.27
Status				
Employed	0.56*	0.15	(2.21)	0.33 - 0.94
Unemployed	0.33**	0.12	(2.97)	0.16 – 0.68
Having CD (yes=1; otherwise=0)	1.51	0.61	1.01	0.68 – 3.35
Having NCD (yes=1; otherwise=0)	2.26	1.12	1.64	0.85 – 5.98
Having Eye, Skin, dental diseases (yes=1; otherwise=0)	2.38	1.52	1.36	0.68 - 8.32
Constant	0.06***	0.03	(5.50)	0.02 – 0.17

Pseudo R^2:0.059; Number of observations: 1,665 households; Wald-Chi2: 58.33; * p <0.05; ** p <0.01, *** p <0.001.
Notes: std err denotes standard error; conf interval denotes confidence interval; CD denotes communicable disease; NCD denotes non-communicable disease.

Matched samples were used for the regression analysis on CHE. When model 2 was run with all socio-economic characteristics included in the initial regression results (Table 14), the propensity score was not balanced with region. In response, model 2 was run again with the following socio-economic characteristics, excluding the variable "region": any children, any education, gender, household size, having a 65 years old household member, wealth quintile,

urban, work status and disease-type. These variables, while all not all associated with health insurance in the logit model (Table 15), allowed a balanced propensity score in both the sample group (with health insurance) and the control group (without health insurance). Parity in terms of characteristics and bias could therefore be addressed and effect of health insurance detected.

Table 15. Estimate of the propensity score – regression of the treatment with independent variables

Insurance	Coef.	Std. Err.	z	[95% Conf.
Quintile (Poorer)				
Middle	0.17	0.25	0.67	(0.32)- 0.65
Rich	0.32	0.24	1.31	(0.16)- 0.79
Richest	0.77***	0.23	3.28	0.31 -1.23
Having children < 4 years (yes=1; otherwise=0)	0.00	0.17	0.02	(0.33) -0.34
Having older > 65 years (yes=1; otherwise=0)	(0.16)	0.23	(0.68)	(0.61) - 0.30
Gender (1=man; 0=woman)	0.14	0.16	0.85	(0.18) - 0.46
Literate (1=literate; 0=otherwise)	0.01	0.21	0.03	(0.41) - 0.42
Urban (1=living in urban area; 0= rural area)	0.27	0.18	1.47	(0.09) - 0.63
Household size	(0.08)	0.04	(2.01)	(0.16) - (0.00)
Status				
Employed	0.16	0.28	0.58	(0.38) - 0.71
Unemployed	(0.02)	0.35	(0.06)	(0.71) - 0.67
Having CD (yes=1; otherwise=0)	0.60*	0.25	2.43	0.12 - 1.09
Having NCD (yes=1; otherwise=0)	0.56	0.40	1.39	(0.23) - 1.35
Having Eye, Skin, dental diseases (yes=1; otherwise=0)	0.98**	0.35	2.77	0.29 - 1.68
constant	(2.48)	0.39	(6.29)	(3.25) – (1.70)

Pseudo R2:0.114; Number of observations: 1,665; Wald-Chi2: 38.32; * p <0.05; ** p <0.01, *** p <0.001. Notes: Coef denotes coefficient; std err denotes standard error; conf interval denotes confidence interval; CD denotes communicable disease; NCD denotes non-communicable disease.

Model 2 regression was run once again with the sample and control groups showing that having health insurance predicted CHE (Coefficient: 0.15, P<0.01) (Table 16). Households with health insurance had a higher rate of CHE than households without health insurance by 15

percent. Notwithstanding, this finding does not confirm the results of the previous logit model in Table 14, which showed that health insurance was not significant despite having a positive effect on CHE.

Table 16. Effect of health insurance on CHE after propensity score matching, household level

Health Service Utilization	Coef	Standard Error	z	[95% conf Interval]
Health insurance (1 vs 0)	0.15***	0.05**	2.86	0.04-0.25

Number of observations: 1,665; * p <0.05; ** p <0.01, *** p <0.001. Coef denotes coefficient; std err denotes standard error; conf interval denotes confidence interval

3.5. Discussion

3.5.1. Effect of health insurance on health-seeking behavior

Cost remains a clear deterrent to health care service utilization in Haiti. This was confirmed by results of the logit analysis in Table 11 showing that being rich, a predisposing factor in the Andersen demand model, increased the likelihood of consulting a health care provider when sick (3.11, p<0.01). Affordability has been documented as a key obstacle to accessing health care services in Haiti in other journal articles or reports: In one study, the population reported not using Traditional Birth Attendants (TBAs) or a hospital for birthing because of the cost (Urrutia et al. 2012). The removal of user fees for maternal and child health services in several facilities in Grand'Anse led to a 200 percent increase in utilization when compared with cost sharing schemes (Altaras, 2009). Other predisposing factors such as having any level of education (OR:1.61, P<0.001) and household size (OR:1.09, P<0.01) were associated with health service utilization and confirm the Andersen model of health-seeking behaviors.

Households with health insurance utilized healthcare more often than those without health insurance. These results were statistically significant (OR: 7.91; P<0.001) and confirmed by the PSM (0.14, P<0.05). Findings from this study corroborate findings from international experience on the effect of health insurance on health-seeking behavior, highlighting a positive association relationship between both variables, and affirming the importance of enabling factors such as health insurance on health service utilization (Evans, 2010; Meng, 2011). Given the low level of utilization of health services in Haiti, these findings offer important guidance to inform future policy recommendations. In that scaling up health insurance would stimulate health care service utilization, controlling for socio-economic factors.

3.5.2. Effect of health insurance on catastrophic health expenditures

The results of this study show that having access to health insurance has an inverse relationship with OOPP and CHE. While the regression analysis showed a positive effect of health insurance on CHE, it was not significant. In contrast, the PSM model showed a significant and positive relationship between health insurance and protection against CHE (0.15 <0.001). Intuitively, one would think that health insurance is a predictive factor for increased health care utilization, as it limits OOPPs and protects households from CHE (Xu, 2010, Aryeetey et al, 2016). However, several other studies have shown that while health insurance leads to higher health service utilization, it can yield higher OOPP and CHE. This is mainly due to the fact that not all services are covered by health insurance premiums and households end up paying more than anticipated. This finding has been replicated in several middle-income countries which have been trying to establish broadly available health insurance programs. For example, China's New

Cooperative Medical Scheme (NCMS) initially covered only inpatient care. While this health insurance program increased utilization, it did not improve financial protection as households were incentivized to use more expensive services. In the Philippines, the expansion of Philhealth coincided with a worsening of financial protection. OOPPs increased by 150 percent from 2000 to 2012, and CHE tripled over the same period. In part this increase was due to the exclusion of medicines from the benefits package. This omission incurred catastrophic spending, as the costs of medicines represented 70 percent of health expenditures among the poorest households (Bredenkamp, 2016).

This study identified several predisposing factors that have a significant relationship on CHE. The first is wealth quintile. Households in the richest quintile were three times less likely to face CHE during a period of illness than were households in the poorest wealth quintile (OR:0.30; $P<0.01$), controlling for other variables. In addition, households in the next to-richest quintile (richer) were 2.38 times less likely of incurring CHE than households in the poorest wealth quintile (OR:0.42; $P<0.01$) ceteris paribus. Having a member aged 65 or older increased the likelihood that a household would face CHE by 82 percent (OR:1.82; $P<0.05$). This may be due to more complex health needs and recurrent health costs required to care for elderly individuals (e.g., for treatment of NCDs that require expensive medications), a key driver of health expenditures in Haiti (Paper 1).

While the literature has shown that having access to health insurance contributed to improving financial protection, particularly when collective risks are pooled (Xu, 2003; Kawabata, 2002), in several low and middle-income countries, present health insurance schemes have not yet reached this stage (Wagstaff, 2009; Brendenkamp, 2016). This may explain the negative

effect of health insurance on financial protection (e.g., due to adverse selection and low enrollment). Haiti's health insurance system currently faces similar challenges which may account for the lower levels of financial protection among households with health insurance Key examples include:

1) Health insurance premiums for the civil servant program have not changed in 15 years[30] and do not cover expenses of typical comprehensive package of health care services. . This means that civil servant households with health insurance still have substantial OOPPs at the point of services.

2) OFATMA require enrollees to pay 20 percent of the total amount of paramedical services (lab, x-ray, drugs) and therefore may not protect households with health insurance from higher OOPP for drugs, the main driver of OOPP expenses and CHE (Paper 1). While this co-payment system prevents adverse selection issues, it may also explain the positive association between households that have health insurance and CHE.

3) Interviews conducted in 2016 with households having health insurance indicated that enrollees experienced a six-month delay in receiving their reimbursements[31]. This delay meant that households were forced to pay in advance for health care costs at the time of service.

[30] An interview with civil-servants in the Ministry of Public Health and Population (MSPP) and the Ministry of Finance (MoF) in 2016 indicated that health services covered by the civil-servant scheme (GSP which became OFATMA in 2015) have not changed over the last 15 years. Interviews were conducted as part of the World Bank Health Financing System Assessment in which the author was involved at the time.
[31] Based on an interview with civil-servants in the MSP and MoF in Haiti in 2016.

3.6. Limitations

The sample size of health insurance holders (N=171 at individual level and 35 at household level) introduced an important limitation in this study. Despite the robust econometric technique (PSM) utilized, the low sample size makes it difficult to draw firm conclusions. Further investigation may be required to support the GoH in developing more targeted policy and programming recommendations to address financial protection associated with OOPP for health care expenditures.

Descriptive statistics confirm that wealthier households are more likely to have health insurance: three quarters of health insurance holders are in the two richest wealth quintiles, and wealth quintile predicts enrolment in health insurance. These findings may uncover confounding factors between wealth quintile and access to health insurance. Given the strong association between having health insurance and wealth quintile, it may be difficult to distinguish whether an observed effect of health insurance on CHE is the result of a household having health insurance or belonging to a high wealth quintile,

The finding that households with health insurance experience more episodes of illness than households without health insurance (Table 3) may be a sign of adverse selection. Under this scenario, households with health insurance may decide to enroll on a voluntary basis due to predisposing conditions as shown by descriptive statistics: 4.2 percent of patients who saw a doctor in 2013 had health insurance compared to 1.6 percent on average who did not have health insurance in the same sample. More specifically, 3 percent of sick individuals with CD who sought care had health insurance, as did 5.1 percent who had NCD and 4.2 percent with specialized medical needs (e.g., vision, dental and dermatological conditions).

3.7. Conclusion and Policy Recommendations

Given that having health insurance stimulates health service utilization and that health service utilization is low in Haiti, it is important that the Ministry of Public Health and Population continue to focus on scaling up access to health insurance in Haiti. This is particularly important to promote increased use of primary health care services among all households associated with UHC tracers' coverage indicators.

The GoH may need to consider making pre-payment for health care services mandatory, and subsidizing health care costs for the poor. A first step towards this goal may be to enforce that employers with more than 50 employees offer health insurance to their workers. Additionally, the MSPP may consider conducting a study to examine the feasibility of co-subsidization of health insurance premiums for the poor by the GoH, international donors and other key stakeholders. As a policy matter, the GoH will need to increase the health insurance risk-pool in order to offer financial protections to poor households and mitigate the devastating effects of CHE.

The MSPP may also wish to conduct further investigations into health expenditure coverage offered by the main health insurance premium programs, such as that offered by OFATMA. This type of study can provide a more comprehensive understanding of the main drivers of OOPP (e.g., the cost of medicines, as explored in Paper 1) and suggest health insurance coverage improvements for OFATMA in the areas of health services consumption and medicine reimbursements.

In concert with further investigations suggested here, the GoH may consider undertaking a program of reforms geared towards improving the overall quality of health services delivered throughout the country. Such improvements may incentivize the uptake of voluntary health insurance enrollment or increase the acceptability of mandatory health insurance enrollment among the general population.

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4. Paper 3: The effect of community outreach[32] on health-facility production in Haiti[33], 2016-2018

4.1. Background

The effect of Community Health Workers (CHW) on health service coverage is well documented in the literature in Low-Income countries (LICs) (Bhutta Z et al. 2010; WHO, 2015; Prasad, 2007). Several studies have shown that work environment factors such as supervision, supplies, respect, and the organization of tasks contribute to CHW performance, and that offering CHWs supportive supervision in their role in health team can result in a higher number of community visits and improved patient health outcomes (Jakuwiez, 2012; Celleti F et al, 2010).

Most of the literature focuses on how the work environment of CHWs effects their capacity to serve communities (e.g., the number of non-institutional visits or visits made at community level), but little is known about how community outreach programs (see note 1) impact overall health-facility production (e.g., the number of institutional visits).

To bridge this gap, this paper examines not only the extent to which CHWs and environment in which they work influence non-institutional visits or health-facility production, but also how CHWs and other staff working at community level (nurses' aide and nurses) contribute to improving health facility production or the number of institutional visits. This research can

[32] Community outreach program is not limited to CHWs' activities only. Community outreach programs encompass all activities (e.g., home-visit, rallies, point-fixes, mobile clinics) performed at community level by CHWs but also by nurses' aides and nurses who dedicate a portion of their time or full-time to community outreach activities. These specific activities are described in detail in the following pages. Community outreach program also refers to family health team defined by the Ministry of Public Health and Population in 2017 and described in the following page.

[33] Health-facility production refers to the number of visits performed at facility level. The author will also talk about "institutional visit" when talking about "health-facility production".

provide important concepts to consider when exploring scaling up community outreach programs.

This research is situated in Haiti, a country characterized by limited fiscal resources for health and poor performance at the health facility level (Cavagnero et al, 2017). Over the last five years, the Government of Haiti (GoH) has allocated less than 4 percent of its budget to health care expenditures, while contributions from external donors to support Haiti's health sector have decreased from 61 percent in 2011 to 49 percent in 2015 (WHO, 2018)[34].

It is widely recognized that the efficiency of health providers in Haiti could be greatly improved. An analysis of how efficiently health inputs are converted into health services received by actual clients reveals that Haiti has very low technical efficiency scores compared with similar low-income countries (LICs) (Hernandez and Sebastian 2013; Akzaili et al., 2008; Sebastian and Lemma 2010; Marshall and Flessa 2011; Kirigia and Asbu 2013; Osmani 2012). In ascending order, dispensaries are the most inefficient point of service, followed by other facility-based outlets, health centers without beds (Centres de Santé sans lit, CSLs), health centers with beds (Centres de Santé avec lit, CALs), and hospitals (Cavagnero et al., 2017). A closer understanding of the effect of community outreach activities on health-facility production will offer important data points to inform the design of relevant policies to enhance performance the health facility level.

Since the early 1980s, Haiti has relied on community outreach activities to promote critical health programs including immunization, behavior, change and communication (BCC),

[34] In 2010, Haiti was hit by an earthquake which led to an increase in international aid, including in the health sector. Since 2011, external funding as share of total health expenditure has been gradually decreasing, albeit remaining a critical source of funding for the Haitian health sector.

maternal and child health (MCH), nutrition and weight monitoring. More recently, supervision and HIV and tuberculosis prevention and treatment programming has been added (Jerome and Ivers, 2010). Notwithstanding these important efforts, a standardized approach to community health programming has not been established across the country, resulting in an unplanned, redundant and at times uncomplimentary mix of services provided by international and local implementing partners who are interested in testing different approaches. In this context, the Ministry of Public Health and Population (MSPP) has endeavored to coordinate a unified strategy and approach to community health services designed to advance Haiti's goal of achieving UHC by the year 2030. The latest household survey (Enquête sur les Conditions de Vie des Ménages Après Séisme (ECVMAS) (International Household Survey Network, 2014) revealed that three quarters of those who receive services from community outreach programming are from the poorest and second poorest quintile (Cavagnero et al, 2017). As described in this author's 'Paper #1', community outreach also appears to be the most effective strategy to protect Haitian households from catastrophic health expenditures (CHE) (Paper #1)[35].

In Haiti, CHW is part of the family health team (FHT), a broader primary health care approach, which represents the first link in the chain of care. Based at the health facility level, FHTs cover catchment populations of 65,000 inhabitants and include one CHW, one nurse's aide ("Auxiliaire" in French) and one FHT nurse manager. The respective functions of each position are outlined in MSPP guide on FHT implementation. While these FHT guidelines were developed

[35] In paper 1, the author demonstrates that households, especially poor households, were less likely to incur CHE by using Community Health Workers (CHWs) than other types of providers, including public and private health care facilities. These findings are aligned with study results showing that CHW-provided services have a negative CI (-0.21) and are therefore most utilized by poor wealth quintiles. In contrast, both public and private outpatient services had positive CIs (0.05 and 0.11 respectively) and are most utilized by the rich wealth quintiles.

in July 2017, they have not yet been endorsed (MSPP, 2017). In theory however, CHWs are supervised on a weekly basis by a community-based nurse's aide or by a facility nurse at the facility level.

CHWs provide a range of services at the community and home-based levels with support from nurse's aide and nurse at community level. For example, FHTs organize community events called 'rallies' where CHWs help mobilizing patients to receive integrated maternal and child health services including Vitamin A, weighing and immunizations for children under age 5, and short-term methods of family planning (FP) from them or a nurse's aide. CHWs can also provide these same health services as part of their home-based visits.

Similarly, CHWs set up temporary service delivery points (called "points fixes" in French) where women can make an appointment to see a nurse's aide for antenatal (ANC) and post-natal (PNC) care visits. CHWs collaborate with different types of community leaders to hold "community meetings" focused on health promotion and health education activities. In addition, depending on funding, health facilities organize "mobile clinics" once a month or every three months, including a medical doctor, to catch up on specific weak health coverage indicators[36].

While Haiti has assessed the role of CHWs in the delivery of community-level services (Ayoya et al, 2013; Jerome and Ivers, 2010), few studies have looked at the role of community outreach activities and their staff ("points fixes", "home-based visits", "rallies" performed by CHWs but also nurses' aides (NA) and nurses dedicating a portion of their time or their entire time to community outreach activities) on health-facility production or the number of

[36] "point fixes" only pertained to ANC, PNC and vaccination services, happen regularly and are only attended by CHWs, nurse's aide and sometimes a nurse. In contrast, "Mobile Clinics" are attended by most facility-staff including a medical doctor and pertain to treat all types of pathologies encountered.

institutional visits. This paper attempts to address this evidence gap by examining whether the FHT or community outreach provided by CHWs, NA and nurses contribute significantly to increasing the number of institutional visits at the health-facility level. Using a mixed-quantitative method approach, this paper assesses two models. The first model measures the effect of community staff (CHWs, AN and nurses[37]) on community productivity. The second model examines the effect of community staff and community productivity on the number of institutional-visits, controlling for modifiable factors and non-modifiable factors[38].

As its sources of data, this study uses the routine health information management system ("Systeme d'Information Sanitaire National Unique (SISNU) (MSPP, 2018)) from 2016 to 2018; and the Service Provision Assessment (SPA) from 2013/2014 (IHE, 2014).

The qualitative portion of this study examines CHWs' work environment (e.g., supervision and coaching from nurses and NA) to: a) gain a better understanding of the factors that facilitate improved CHW productivity, and b) learn how these factors are associated with improved health-facility production too.

4.2. Theoretical Framework

This paper tests two hypotheses: The first hypothesis looks at whether CHWs and nurses who dedicate a portion of their time to community work increase community productivity, as measured by the number of non-institutional visits divided by number of total staff. The literature

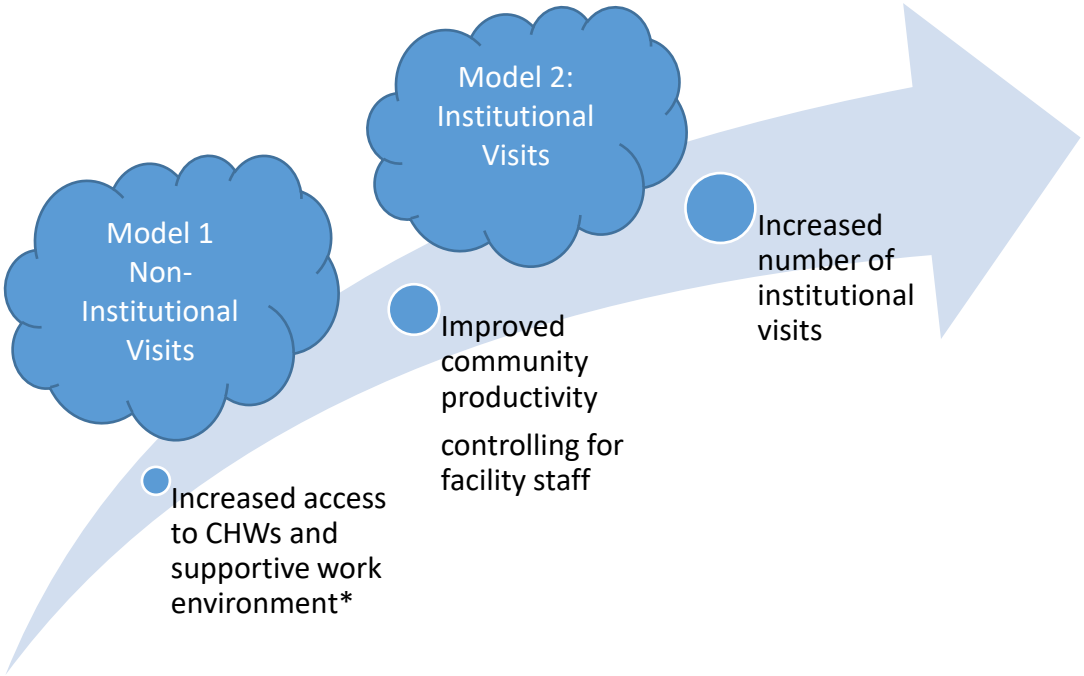
[37] In Haiti, not all AN and nurses work at community level. A costing study of health services at dispensaries, health centers without beds and health centers with beds (MSH, 2012) demonstrate that on average there is one community nurse and one to two NA per health center with and without beds. Therefore, the author estimated that 15 percent of nurses and ANs accounted for in the Service Provision Assessments (IHI, 2013) were focusing on community activities.

[38] Modifiable factors include policies or mechanisms which can be adapted to unlock health delivery and financing challenges in Haiti to perform better (e.g., donor support). Non-modifiable factors are fixed factors that cannot be changed (e.g., geography, facility type and ownership).

both internationally and in Haiti has already documented this type of hypothesis. However, the present study examines the issue in Haiti utilizing more recent data from 2016-2018. The second hypothesis measures whether the same community productivity, as well as the number of community staff can predict overall health-facility production or number of institutional visits, controlling for facility health staff, donor funding, geography, facility type, department and ownership.

These two-hypotheses are interrelated based on the understanding that: a) access to CHW services is correlated with an increased number of non-institutional visits per staff; and b) access to CHWs also leads to an increased number of institutional visits given that community-based activities incentivize more patients to seek health care services and generate increased rates of referral to facility-based consultations. The testing of these two hypotheses is summarized in Figure 5.

Figure 4. Theoretical Framework



***workload, supportive supervision, supplies and equipment and respect**

Quantitative study:
Model 1: Examines the effect of access to CHW services on increased community productivity;
Model 2: Examines how access to CHW services and increased community productivity predict Health Facility (HF)-based production.

Qualitative study:
Examines the 'process' of enabling increased community outreach production.

The author hypothesizes that improved community productivity leading to increased institutional visits may be the result of changes in Division of Labor (DoL). The 'factors of production' refer to environmental resources including land, labor, capital, and enterprise. However, this study focuses on the complementarity of two separate labor pools: CHWs and facility-based staff. In his 1922 book, "An Inquiry into the Mature and Causes of the Wealth of Nations", Adam Smith discusses the concept of DoL (Smith, 1922) and outlines how it plays a vital

role in increasing the Productivity of Labor (PoL). In the present study, DoL refers to a simple combining of work inputs by both nurses and CHWs which has the potential to yield an increased number of institutional visits. This configuration combines the work of CHWs and a portion of facility-based health staff who, together, are focused on providing health services at the community-level. In contrast, a traditional configuration features solely facility-based staff who only provide facility-based health services. The author hypothesizes that the right "mix", or DoL between CHWs and facility-based providers will ultimately result in overall time savings and increased facility-production or number of institutional visits.

On the other hand, if too many facility-based staff spend time at the community level, there may be a 'tipping point' representing diminishing returns on health-facility production and overall health service utilization. In this type of scenario, the number of institutional visits may increase at a lower rate and begin to stagnate.

This principle is illustrated in a production function (PF), meaning the relationship between input quality (e.g., the combination of community and institutional staff), and output quantity (e.g., institutional visits). All told, the PF curve flattens as the number and type of workers increases, which reflects a diminishing marginal product[39] (Mankiw, 2009).

[39] The property whereby the marginal product of an input declines as the quantity of the input increases (Mankiw, 2009)

4.3. Methodology

4.3.1. Quantitative Analysis

Sample size

The unit of observation of the sample size was the health facility in Haiti. The total sample size was 1,953 health facilities. Data from 651 health facilities was examined during 2016 and 2017, and through July in 2018. The author created a database combining variables from the SISNU and the Service Provision Assessment (SPA). For SISNU, data included number of visits and non-institutional visits for 2016, 2017 and 2018. Human resource data from the 2014 Service Provision Assessment (SPA) were included to support this study, as they were not available in SISNU.

Descriptive Statistics and Variables

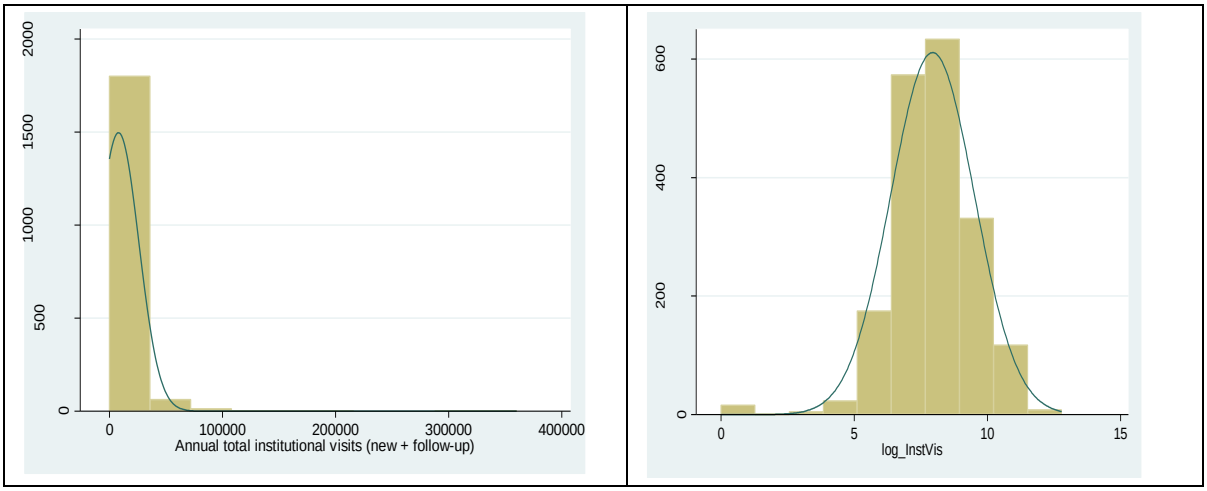
Dependent variable

The first model (Model A) tests the effect of the number of community staff (CHWs and other facility-based staff such as NA and nurse) on community productivity (i.e., the number of non-institutional visits divided by number of total staff), while the second model tests community productivity (Model B1) and number of community staff (Model B2) on overall health-facility production, measured by proxy as the number of institutional visits.

The author ran a histogram of institutional visits to describe their distribution, finding that observations are clustered at 0 (Figure 6), and confirming a potential problem of normality which may create statistical inference with the final models. When estimating the number of institutional visits using a log function, there was less variation: The mean and median log of

institutional visits was 7.94 and 7.91, respectively, whereas the mean and median of the number of institutional visits before the log transformation was 8,029 and 2,741 institutional visits, respectively (Table 17).

Figure 5. Histogram of institutional visits and log of institutional visits



Source: Authors, based on SISNU for 2016, 2017 and through July,2018.

Table 17. Number of health facilities with 0 non-institutional or institutional visits

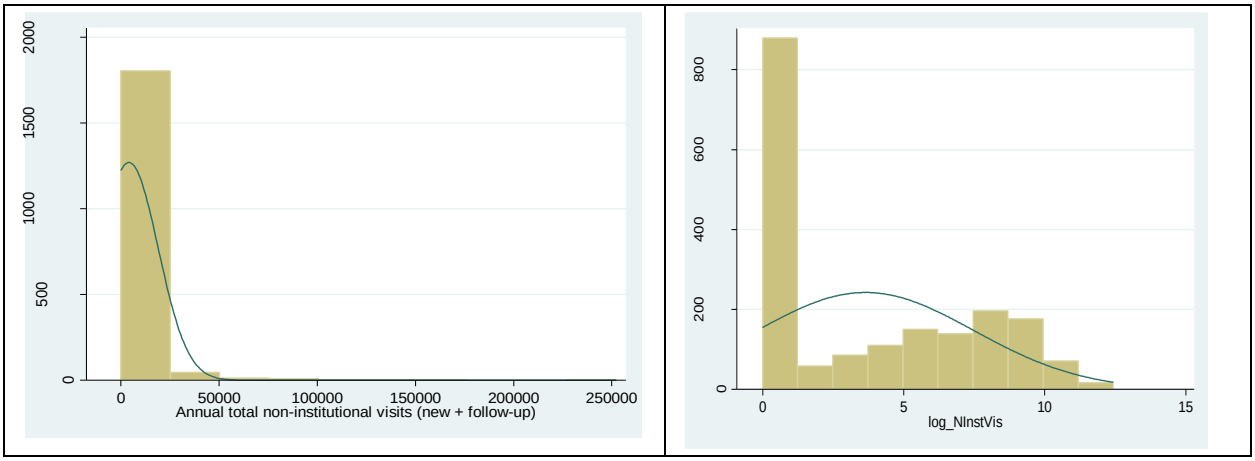
	Dispensary	Health Centers w/o bed	Health Centers w beds	Hospitals	Total
Facilities with 0 institutional Visits	3	9	1	3	16 (1%)
Facilities with 0 Non-institutional visit	318	249	148	145	860 (45%)
Facility with 0 CHW	195	183	87	90	555 (28%)
Facility with 0 Nurse	6	0	0	. 3	9 (<1%)
Facility with no Staff	0	0	0	3	3 (<1%)

Source: Authors, based on SISNU 2016-2018. Notes: CHW denotes community health worker' w/o denotes without.

Similar findings were observed for non-institutional visits: On average, health facilities had 4,071 institutional visits. However, 50 percent of the sample of health facilities had fewer than 12 non-institutional visits, and the range was very broad (0-252,136). The log transformation

of the number of non-institutional visits made the distribution more normal (mean:3.64; median: 2.56) (Figure 7)[40].

Figure 6. Histogram of non-institutional visits and log of non-institutional visits



Source: Authors, based on SISNU 2016-2018

Independent variables (Modifiable variables)

Less variation was observed in the independent variables than in the dependent variables

On average, health facilities had 22 staff persons, yet 50 percent of health facilities employed fewer than 10 staff persons. This range can be attributed to the sample selection, given that almost half (i.e., 43 percent) of the health facilities were dispensaries which typically have only 1 to 2 staff persons. This range in number of staff persons is important given that 14 percent of the sample also included hospitals (0-388 staff persons).

On average, health facilities employed 9 nurses, and 50 percent of the sample had fewer than 3 nurses. The range remained very broad (0-224 nurses).

[40] However, the histogram of the log of non-institutional visits still showed some abnormality because 45% of the health facilities had non-community health visits.

There was less variation in health facilities with CHWs, perhaps because the sample size with CHWs was smaller. On average, there were six CHWs per health facility and 50 percent of health facilities employed fewer than three CHWs.

The author also created a variable accounting for community staff, given that there were health-facility staff (particularly nurses, including NA), who dedicated a portion of their time to outreach activities. Based on a costing study of primary health care services conducted by Management Sciences for Health (MSH) in 2011 (MSH, 2012), the author assumed that 15 percent of nurses working at the health facilities the author studied, included in this study also worked at the community level. On average, health facilities employed seven staff persons working at the community-level (i.e., the sum of the number of CHWs and the 15 percent of the number of NAs and nurses), and less than 50 percent of health facilities employed three staff persons working at the community -level[41].

There were also two independent policy variables used in Models B1 and B2, respectively: 1) total health worker productivity (e.g., community visits) which was a log variable (*log of non-institutional visit divided by the number of total staff*). Since this variable is estimated in log, the variation was low (mean: 2.41; median: 0.96; range: 0-11). Similarly, the community staff variable was a ratio (number of community staff out of total staff) and the mean and median of this variable were almost identical (Mean:37 percent; Median: 38 percent).

Independent variables (Non-Modifiable variables)

The models A, B1 and B2 controlled for a series of non-modifiable variables, including district (or "départements" in French), geography, donor, facility type and management. Given the sample was representative, there were more observations in more densely populated districts: 27

[41] The number of health facility staff persons working at the community-level was calculated as the ratio of these workers to the total number of staff employed by health facilities.

percent, 15 percent, 11 percent and 11 percent of the health facilities were in the West, Artibonite, the North-West and the North. Most of the health facilities were in urban areas (63 percent), 13 percent in the metropolitan areas and 23 percent in rural areas. Almost half of the health facilities were managed by the public sector, while 13 percent were managed by NGOs and 17 percent were run by the private-for profit sector. Twenty-four percent of the sample sites were considered 'mixed management (e.g., managed by both public and private sectors). The World Bank (WB), Centers for Disease Control and Prevention (CDC) and US Agency for International Development (USAID), respectively, supported 20 percent, 17 percent and 15 percent of all health facilities; while the Global Fund (GF) and Canadian International Development Agency (CIDA) supported 10 percent and 11 percent, respectively, of health facilities (Table 18).

Table 18. Summary of dependent variables (2016- 2018)

	Observation	Mean	Median	SD	Minimum	Maximum
Institutional visits	1,882	8,029	2,741	18,061	0	360,084
Log of institutional visits	1,882	7.94	7.91	1.57	0	12.79
Non-Institutional Visits	1,882	4071	12	14,915	0	252,136
Log of Non-Institutional Visits	1,882	3.64	2.56	3.85	0	12.43
Total Number of Staff (2014)	1,953	22	10	38	0	388
Community productivity defined as log of (NonIns/TotNumStaff)	1,879	2.41	0.96	2.73	0	10.82
Community Health Workers (2014)	1,953	5.96	3	10.36	0	100
Nurses and Nurses' Aides (2014)	1,953	8.74	3	18.75	0	224
Community staff (2014)**	1,953	7.27	3.3	11.54	0	111.25
Ratio of community staff (community staff/total staff)	1,950	38%	37%	27%	2%	96%
Quadratic measure of the ratio of community staff (ratio of community staff*ratio of community staff)	1,950	22%	14%	23%	0%	93%
Department*	1,953	100%				
West	525	27%				
South-East	123	6%				
North	207	11%				
North-East	102	5%				
Artibonite	300	15%				
Centre	108	6%				
South	171	9%				
Grand'Anse	120	6%				
North-West	213	11%				
Nippes	84	4%				
Area*	1,953	100%				
Metropolitan	261	13%				
Other Urban	450	23%				
Rural	1,242	64%				
Facility Type*	1,953	100%				
Dispensary	843	43%				
Health Center w/o bed	528	27%				
Health Center w bed	318	16%				
Hospitals	264	14%				
Management Authority*	1,953	100%				
Public	894	46%				
NGO	258	13%				
Private for profit	339	17%				
Mission	462	24%				

Donor Support*	1,953	100%				
Global Fund	189	10%				
CDC	336	17%				
USAID/SSQH	381	20%				
Canada	210	11%				
WB	285	15%				

Source: Authors, based on SISNU 2016-2018 and SPA 2013-14. Notes: SD denotes standard deviation; NGO denotes non-governmental organization; CDC denotes Centers for Disease Control and Prevention; USAID/SSQH denotes United States Agency for International Development/Services de Santé de Qualité pour Haïti; WB denotes World Bank. *There is no median, SD, and range estimate for discrete variables as they can only take a certain number of values. ** community staff is the sum of CHWs and 15 percent of NAs and nurses included the database based on MSH costing study (MSH, 2012).

Econometric model

The main challenge with an ordinary least squares (OLS) model for service utilization or health-facility production is that the distribution is skewed because it contains a large proportion of zero (MLR 6 is violated). The author has addressed this challenge with the log transformation of the dependent variable so that it became closer to a normal distribution (no more 0). The second option was to run a two-part model. The number of missing values for IN (institutional visits) was not considerable and most health facilities had institutional visits, the author opted for the one-part model (less than 1 percent of the health facilities have 0 institutional visits or 16 health facility of out of 1,937). However, 45 percent of health facilities have 0 community visits. Nevertheless, since the results remained significant with the log transformation of the community productivity (non-institutional visits/total staff), the author maintained a one-part model.

The author used two types of econometric models: 1) a pooled OLS model and 2) a random effect (RE) model. A pooled OLS model was used to assess the effect of year and the RE model was used based on the assumption that the main modifiable factors (e.g. community staff and productivity of total staff with respect to non-institutional visits) were constant over time and were not affected by unobserved factors. Indeed, between 2016 and 2018, there were no

policy changes made which could have affected the number of CHWs and the community productivity scores of staff.

The author tested two models with both OLS and RE. Model A tested the effect of the number of community staff[42], transformed into a ratio, on community productivity (the dependent was the log of non-institutional visits divided by total staff). Models B1 and B2 utilized two variants of testing community staff or outreach on health-facility production (institutional visits): Model B1 tested whether the productivity of health staff with respect to non-institutional visits predicts health-facility production, while Model B2 tested whether the number of community staff, transformed into a ratio, had a better effect on the health-facility production.

OLS Pooled model

Model A. Dependent: Log of Non-Institutional Visits divided by Total Staff

$$\ln(\text{Non-Institutional Visits/Total Staff}^*) = O_t + \beta_1 \text{Ratio(Community Staff)} + \beta_2 \ln(\text{TotalStaff}) + \beta_3 \text{department} + \beta_4 \text{location} + \beta_5 \text{facility type} + \beta_6 \text{ownership} + \beta_7 \text{GF} + \beta_8 \text{CDC} \beta_9 \text{SSQH} + \beta_{10} \text{Canada} + \beta_{11} \text{WB} + \beta_{at} + \text{Year}_t$$

*community productivity

Model B1. Dependent: Log of Institutional Visits

$$\ln(\text{Institutional Visits}) = O_t + \beta_1 \ln(\text{Non-Institutional Visits/Total Staff}^*) + \beta_2 \ln(\text{TotalStaff}) + \beta_3 \text{department} + \beta_4 \text{location} + \beta_5 \text{facility type} + \beta_6 \text{ownership} + \beta_7 \text{GF} + \beta_8 \text{CDC} \beta_9 \text{SSQH} + \beta_{10} \text{Canada} + \beta_{11} \text{WB} + \beta_{at} + \text{Year}_t$$

*community productivity

Model B2. Dependent: Log of Institutional Visits

$$\ln(\text{Institutional Visits}) = O_t + \beta_1 \text{Ratio (Community Staff)} + \beta_2 \ln(\text{TotalStaff}) + \beta_3 \text{department} + \beta_4 \text{location} + \beta_5 \text{facility type} + \beta_6 \text{ownership} + \beta_7 \text{GF} + \beta_8 \text{CDC} \beta_9 \text{SSQH} + \beta_{10} \text{Canada} + \beta_{11} \text{WB} + \beta_{at} + \text{Year}_t$$

[42] the sum of CHWs and 15 percent of NAs and nurses in the database based on MSH costing study (MSH, 2012)

Random Effect Model

Model A. Dependent: Log of Non-Institutional Visits divided by Total Staff

$$\text{Ln(Non-Institutional Visits/Total Staff*)}_{j} = \mu + \beta_1 \text{Ratio(Community Staff)}_t + \beta_2 \ln(\text{TotalStaff})_t + \beta_3 \text{department}_t + \beta_4 \text{location}_t + \beta_5 \text{facility type}_t + \beta_6 \text{ownership}_t + \beta_7 GF_{it} + \beta_8 CDC_t \beta_9 SSQH_t + \beta_{10} \text{Canada}_t + \beta_{11} WB_t + U_i + W_j$$

**community productivity*

Model B1. Dependent: Log of Institutional Visits

$$\text{Ln(Institutional Visits)}_{j} = \mu + \beta_1 \text{Ln(Non-Institutional Visits/Total Staff*)}_t + \beta_2 \ln(\text{TotalStaff})_t + \beta_3 \text{department}_t + \beta_4 \text{location}_t + \beta_5 \text{facility type}_t + \beta_6 \text{ownership}_t + \beta_7 GF_{it} + \beta_8 CDC_t \beta_9 SSQH_t + \beta_{10} \text{Canada}_t + \beta_{11} WB_t + U_i + W_j$$

**community productivity*

Model B2. Dependent: Log of Institutional Visits

$$\text{Ln(Institutional Visits)}_{j} = \mu + \beta_1 \text{Ratio(Community Staff)}_t + \beta_2 \ln(\text{TotalStaff})_t + \beta_3 \text{department}_t + \beta_4 \text{location}_t + \beta_5 \text{facility type}_t + \beta_6 \text{ownership}_t + \beta_7 GF_{it} + \beta_8 CDC_{it} \beta_9 SSQH_t + \beta_{10} \text{Canada}_{it} + \beta_{11} WB_t + U_i + W_T$$

Where productivity was the log of non-institutional visit divided by the number of total staff; community staff was the ratio of community staff out of total staff; department was a dichotomous variable for department with West being the comparator; location was a dichotomous variable for metropolitan, urban and rural with metropolitan being the comparator; facility type was a dichotomous variable for dispensary, health center without beds, health center with beds and hospitals, with dispensary being the comparator; ownership was a dichotomous variable for public, Non-Governmental Organization (NGO), private and mixed types of facilities with public being the comparator; Global Fund (GF) was a dummy variable for no GF funding (coded 0) and GF funding (coded 1), CDC was a dummy variable for no CDC funding (coded 0)/CDC funding (coded 1); SSQH was a dummy variable for no SSQH funding (coded 0) /SSQH funding (coded 1); Canada was a dummy variable for no Canada funding (coded 0) /Canada funding (coded 1) and WB was a dummy variable for no WB funding (coded 0)/WB funding (coded 1).

4.3.2. Qualitative Analysis

To better understand the factors driving community productivity in Model A, the author conducted a retrospective, case control qualitative study. Twenty health facilities were selected using the SISNU based on data analyzed in 2016, 2017 and 2018. Ten health facilities had low performance and 10 had higher performance. Criteria used for selections were the average number of institutional visits and a few productivity ratios including the number of institutional visits divided by all staff and the number non-institutional visits divided by the number of CHWs (Table 19).

Table 19. Selection of the Qualitative Sample

	Number of Health Facilities High (N=10)	Number of Health Facilities Low (N=10)
Average Institutional Visits 2016	18,105	4699
Average Monthly Institutional visits, 2016	1,509	392
Average Number of NCHW 2013	15	12
Average number CHW, 2013	8	6
Average Monthly Total Productivity, institutional visit/NCHW+CHW	85	36
Average Monthly Partial Productivity, Inst visits/NCHW	135	59
Average Institutional Visits, 2018	2,278	571
Average non- Institutional visits, 2018	1,184	131
Average Number of NCHW 2018	12	14
Average number CHW, 2013	13	11
Average Monthly Total Productivity, institutional visit/NCHW+CHW	228	24
Average Monthly Partial Productivity, Institutional visits/NCHW	256	43
Average Monthly Partial Productivity, Non-Institutional visits/NCHW	78	14

Source: Authors, based on SISNU 2016-2018 and SPA 2013-14. CHW denotes community health worker, NCHW denotes non-community health worker.

Health facilities were selected based on type of facility (e.g., dispensary, health facility with bed, and health facility without bed), District or "Département" in French (West, Northwest and Nippes), and Management (i.e., government, NGO, private). Qualitative key informant interviews and focus groups were conducted in the 20 health facilities. In addition to a health provider survey to gather basic information on supplies, drugs and services, two types of focus groups were conducted: 1) Community Health Worker Focus Group: Administered to community health workers available and affiliated with each health facility; 2) Female Patient Focus Group: Administered to mothers who were attending the facility for an antenatal care, well-child, or post-natal care visit. Factors that were included in the qualitative analysis included environmental factors potentially explaining performance based on the literature (Bowser et al,

forthcoming): general issues in the facility (supplies, drugs, services); Communication within the facility; respect within the facility; discrimination, general impressions of quality; use, activities, supervision, and management of CHWs.

When the authors conducted a t test between the high and low performing health facilities, they discovered that overall the sample from the qualitative study (N=19) did better than the other sample (N=634) in terms of productivity (2 t test significant), while the 10 high performers (N=10) did much better than the low performers (N=9) in terms of productivity (1 t test significant) (See Appendix).

4.4. Results

4.4.1. Quantitative Findings

Model A. Community staff[43] predict community productivity of health facilities

The OLS and random effect models show consistent results: the number of community staff predicts the number of non-institutional visits produced by total staff. The ratio of community staff is positive (1.98). As the ratio of community staff increases, the productivity of non-institutional health facilities also increases, ceteris paribus. The relationship is highly significant (P<0.001). If the community ratio increases by 10 percent or 0.10, then the non-institutional visits productivity grows by 26 percent (1.98*0.10), holding everything else constant. However, the log of total staff has a negative relationship on non-institutional productivity and it is very significant. This is normal: as the log of total staff increases, staff may be spending more

[43] Include CHWs as well as NAs and nurses who are working at community level. The author estimated that 15 percent of NAs and nurses in the database were working at community level based on MSH, 2012. The author added CHW to 15 percent of NAS and nurses to estimate the variable "community staff".

time on productivity at the health-facility level at the expense of the community level. Compared to public facilities, NGOs and mixed-facilities have a positive effect on community productivity, holding everything else constant: NGO and mixed management facilities lead to a 0.37 and 4.5 increase in community productivity compared to public facilities, respectively. Similarly, USAID/Services de Santé de Qualité (SSQH) facilities lead to a 3.20 increase in community productivity compared to services supported by other funding streams, holding everything else constant, and is highly significant.

Model B1. Community productivity predicts health-facility production

Model B1 examines the effect of community productivity on health facilities production, controlling for geography, management, donor, facility type, size of the facility and departments. A 10 percent increase in community productivity leads to a 9 percent (OLS) or 10 percent (Random Effect-RE model) increase in the health-facility production, or number of institutional visits, holding everything else constant and is highly significant. Similarly, a 1 percent increase in the total number of staff increases the health-facility production by 54 percent in both OLS and RE models, holding everything else constant and is highly significant. When compared to dispensaries, health facilities without beds and hospitals both led to 0.29 and 0.52 increases in facility productivity, respectively. Each had a positive coefficient both were very significant. NGOs and private for-profit health facilities also had positive and very significant coefficients. This means that compared to public health facilities, NGOs and private for-profit facilities have the potential to generate higher facility production. CDC-funded facilities led to a 0.59 increase in health facilities production and had a positive and very significant coefficient. The pooled OLS model suggests that results have not changed between 2016 and 2017. However, in 2018 that

health facilities production decreased. This may be due to having only seven months of 2018 data compared to the full 12 months of data available in 2016 and 2017.

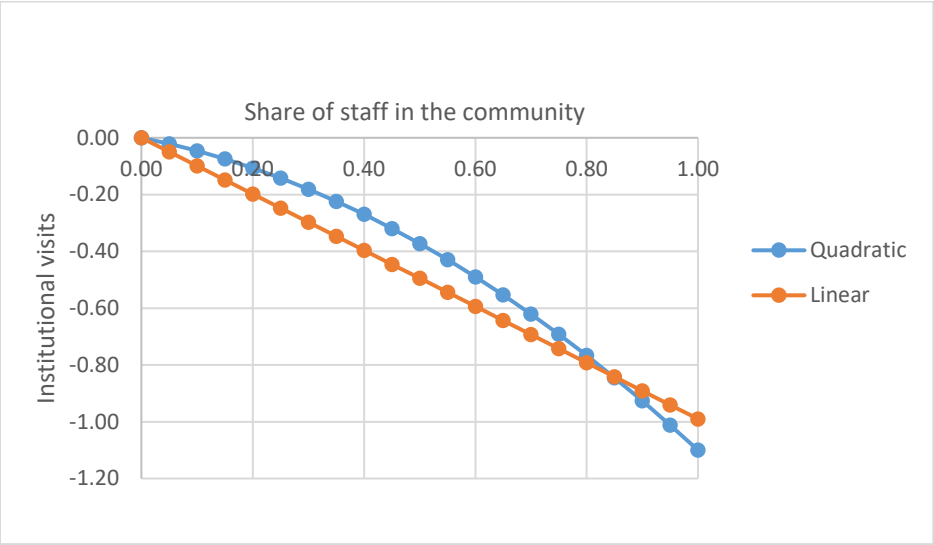
Model B2. Community staff has a negative effect on health-facility production

Model B2 examined the effect of community staff on health facilities production, controlling for geography, ownership, donor, facility type, size of the facility and departments. Findings showed that the number of community staff had a negative effect on health-facility production: A 10 percent increase in community health worker ratio led to a 9.9 percent decrease in health-facility production, *ceteris paribus* and is highly significant. In contrast, a 1 percent increase in the total number of staff persons increased health-facility production by 68 percent in both OLS and RE, holding everything else constant, and is highly significant. As in Model B1, Model B2 found several control variables or non-modifiable variables are significant, holding everything else constant. Similarly, an increase in the total number of staff persons increased health facility production among NGOs and private for-profit health facilities. Health facilities supported by CDC had a positive and very significant coefficient, leading to a 0.33 increase in health facilities production, holding everything else constant; while USAID/SSQH-supported facilities experienced an increase in health-facility production by 0.52, holding everything else constant. The pooled OLS model suggests that results of Model B2 have not changed between 2016 and 2017, but that (during the first seven months of) 2018, health facilities production decreased for the same reason as in model B1. Health facilities in the north and central departments respectively had a positive and very significant coefficient, which impacted favorably on health-facility production.

The author also ran Model B2 with a quadratic measure[44] of the variable "community staff", which is a ratio variable (community staff/total staff). The quadratic measure of the "community staff" variable is noted "ratio 2" in Table 20. Ratio 2 had a positive effect on institutional visits to a certain degree. Further increases of ratio 2 resulted in a negative effect, whereas any increases in community staff may impede production of health-facility visits. This could imply that increased numbers of community staff may have a negative impact on health-facility production. The author imputed both community staff (noted "ratio" in table 4) and the quadratic measure of community staff (noted "ratio 2" in Table 20) as independent variables finding that both variables were negative and not significant. Therefore, the best model remains a linear one with a coefficient of -0.99 for the community staff variable (Model B2). The value of the quadratic measure of community staff (-0.27) is the value at which the dependent variable (health-facility production or log of number of institutional visits) would be maximized. However, in this study the value of the quadratic measure of community staff (ratio 2) could not be maximized with the specification used. Therefore, the tipping point at which increased numbers of community staff do not contribute to institutional visits could not be determined.

[44] A polynomial term–a quadratic (squared) or cubic (cubed) term turns a linear regression model into a curve (Grace-Martin, 2018).

Figure 7. Exploration of the impact of community staff on output



Source: Authors, based on SISNU 2016-2018 and SPA 2013-2014 data.

Furthermore, results from the RE estimates sound more efficient than those from the OLS estimates, especially when running the B1 model (Table 20). In the B1 RE model, the community productivity led to a 10 percent increase in health-facility productivity compared to a 9 percent increase in the B1 OLS model. Additionally, a few independent variables had a significant effect on health-facility production with the RE estimates (e.g., health facilities in rural areas compared to health facilities in metropolitan area) but not with the OLS estimates. In a few other cases, the coefficient of several independent variables was stronger in the B1 RE model than in the B1 OLS model (e.g., health centers without beds and hospitals compared to dispensaries). Given the B1 RE model yield more efficient results, the author has chosen to report the results of the RE in the conclusion and policy recommendation section of paper #3.

Table 20. Results of the OLS and Random Effects Models for A, B1 and B2

	Model A Dependent: Log of Non-Institutional Visits divided by Total Staff (community productivity)		*Model B1 Dependent: Log of Institutional Visits (health-facility production)*		*Model B2 Dependent: Log of Institutional Visits (health-facility production)*		*Model B2 with quadratic measure Dependent: Log of Institutional Visits (health-facility production*	
	OLS	RE	OLS	RE	OLS	RE	OLS	RE
Community productivity defined as Ln(NInst/Tot staff)			0.09***	0.10***				
Community staff defined as a ratio (com_staff/totstaf)	1.98***	1.98***			-0.99***	-0.99***	-0.39	-0.39
Quadratic measure of community staff defined as ratio 2(=ratio*ratio)							-0.71	-0.72
Ln (Total Staff)	-0.29**	-0.29**	0.54***	0.54***	0.68***	0.68***	0.69***	0.69***
Departement (West)								
South-East	-0.40	-0.39	0.08	0.08	0.13	0.13	0.12	0.12
North	0.22	0.22	0.45**	0.45***	0.36**	0.36**	0.35**	0.35**
North-East	0.53	0.53	-0.05	-0.05	-0.15	-0.15	-0.17	-0.17
Artibonite	-0.01	-0.01	0.06	0.06	0.11	0.11	0.12	0.12
Central	0.70	0.70	0.59***	0.59***	0.75***	0.75***	0.74***	0.74***
South	-0.32	-0.32	0.13	0.13	-0.04	-0.04	-0.06	-0.06
Grand-Anse	0.23	0.23	0.24	0.23	0.18	0.18	0.17	0.16
North-West	-0.40	-0.39	-0.14	-0.14	-0.15	-0.15	-0.15	-0.14
Nippes	0.50	0.51	0.34	0.33*	0.37*	0.37*	0.35*	0.35*
Location (metropolitan)								
other urban	0.17	0.17	0.03	0.02	0.15	0.15	0.14	0.14
rural	0.37	0.36	-0.28	-0.29*	-0.09	-0.09	-0.10	-0.10
Facility Type (dispensary)								
HC w/o bed	0.04	0.04	0.29**	0.30***	0.07	0.07	0.06	0.06
HC with bed	-0.20	-0.20	0.20	0.21*	-0.11	-0.11	-0.13	-0.13
Hospitals	0.10	0.10	0.52**	0.53***	-0.02	-0.02	-0.02	-0.02
Ownership (public)								
NGO	0.30	0.30	0.38**	0.38***	0.31**	0.31**	0.31**	0.31**
For Profit	0.37*	0.37*	0.29**	0.29***	0.28**	0.28**	0.28**	0.28**
Mission	0.45***	0.45***	0.05	0.05	0.09	0.09	0.09	0.09
Donors								
Global Fund	-0.10	-0.11	0.24	0.23*	0.24	0.23*	0.23	0.22*
CDC	0.18	0.18	0.49***	0.49***	0.33**	0.33**	0.32**	0.32**
SSQH	3.20***	3.20***	0.06	0.06	0.52***	0.52***	0.51***	0.51***

Canada	-0.22	-0.22	0.01	0.01	0.03	0.03	0.04	0.04
WB	0.10	0.09	0.12	0.12	0.17	0.16	0.18	0.17
Year								
2017	0.01		0.00		0.01		0.01	
2018	-0.58***		-0.47***		-0.52***		-0.52***	
cons	1.47***	1.30***	5.94***	5.78***	6.17***	6.02***	6.11***	5.96***
N	1,879	1,879	1,879	1,879	1,879	1,879	1,879	1,879
R-squared	0.35		0.40		0.40			

Legend: *p<0.05; ** p<0.01: *** p<0.001. Notation: OLS denotes ordinary lease squares; w/o NGO denotes without non-governmental organization; USAID/SSQH denotes Services de Santé de Qualité pour Haïti; WB denotes World Bank; const denotes constant. In green are significant coefficients.

4.4.2. Qualitative Findings

The results of the CHW focus group confirms that CHWs play a role in improving number of non-institutional visits, or community productivity, as demonstrated in Model A (Table 21). This finding underscore that in low performance facilities, CHWs may lack supervision and may not have been given clear job descriptions. In contrast, the roles and responsibilities may have been much clearer for CHWs working in highly productive facilities. The focus group also confirmed that CHWs attract patients to facilities, thereby increasing health-facility production. However, Model B2 showed the effect of community ratio on health facility was not significant. Facilities performing highly in both community and institutional productivity also appear to receive more NGO or donor funding. This finding conforms with the results of the quantitative study.

Table 21. Results of the qualitative survey highlighting the effect of process factors on community production

	Highly Productive Facilities	Low Productive Facilities
ANC visits/CHWs; Focus Group with ANC Patients	Patients received visits from CHWs after their delivery; Patients discussed the importance of regular ANC visits; CHWs do more in community (conduct home consultation, vaccination)	Patients were not told that there is a minimum number of recommended ANC visits; delivery plan and education on giving birth at a facility discussed at community meetings; patients did not receive home consultations from CHWs
Supervision: Focus Group with CHWs	CHWs are clear on their roles and responsibilities; lack of individual supervision	CHWs are clear on their role; no formal jobs description for CHWs; not enough supervision provided
Communication: Focus Group with CHWs	CHWs bring a patient to facility, confusion with staff on reason for the visit; CHWs worry that patients will complain or suggest improvements about the facility to them; they lack resource to file complaints	CHWs provide regular reports and receive feedback on reports
Challenges: Focus Group with CHWs	Lack of contract in place. Regular training needed; CHWs could take on additional tasks once trained; CHWs provide valuable services at home for patients; Some CHWs have not received salary from the Ministry of Public Health and Population since 2014	Accompany patients to facility to deliver; not all services provided at facility (must refer patients to other health centers)
Working with CHW: Facility Interviews	NGOs are the common source of funding of CHWs (70%), Government funds 30% of CHWs. CHWs work an average of 6.5 hours per day. CHWs play an important role in increasing the number of consultations and improving the quality of health services [where?]	NGOs are the most common source of funding for CHWs (50%), Government fund 30% of CHW

4.5. Discussion

The objective of this research was to test the effect of community outreach on health-facility production in Haiti. The working hypothesis was that community outreach programs defined as community staff (sum of CHW and 15 percent of total number of NAs and nurses in the database) incentivize patients utilize facility-based health care services, thereby increasing the number of health visits. Study findings identified that this is not the case. The model utilized in this study found a

negative linear relationship between community staff and health-facility productivity (-0.99, P<0.001). However, findings also showed that community productivity led to improved health-facility production. For example, a 10 percent increase in community productivity led to a 10 percent increase in health-facility production (P<0.001) with the RE model. The availability of community staff (e.g., nurses, NAs and CHWs) improved community productivity by 26 percent (P<0.001) over time demonstrating that community staff play an indirect role in health-facility production.

Given that community staff also include nurses and nurses' aides, econometrics analysis in this study found a tipping point where an increased number of community staff offers diminishing returns for the overall health-facility production. This finding confirms the hypothesis used in Section 2 production function, namely: the number of institutional visits decreases proportionately with the amount of time nurses and nurses' aides spend working out in the community.

Findings from the qualitative portion of this study show that in high performing facilities, CHWs may have established contracts, more defined roles and may receive an adequate level of supervision. These results were not as apparent in the quantitative portion of the study. The literature also documents that the overall work environment (e.g., better management and supervision of CHWs) improves both results (Baatiema L, 2016, Prasad, 2007) and productivity of CHWs (Jakiewicz, 2012). However, the models employed in this study show that investments in CHW supervision may offer diminishing returns if the facility or institutional staff hired to supervise CHWs spend less time at health-facility level.

These findings have important policy implications and focus on the need to develop standardized guidelines for training, supervision and management of CHWs in Haiti. This finding also points to the need to ensure that providers engaged in supervising CHWs have commensurate coverage at the facility level so as not to drain limited resources there.

These results also highlight that certain donor programs support both community productivity and health-facility production. In the case of community productivity, facilities in the USAID/SSQH performance-based financing program increased community productivity by 3.20 (P<0.01). This finding makes intuitive sense, as its predecessor project emphasized and invested in resources such as supervision which are favorable to community productivity. In the case of CDC, their impact is recorded with respect to health-facility production in Model B1 (0.46, p<0.01) and B2 (0.33, P<0.01) and USAID/SSQH also contributes to better health-facility production in Model B2 (0.52, P<0.01). Both these programs provide various technical assistance (TA) and input, which may explain the results. Further analysis is required to more fully understand what types and amount of donor-funded TA will be needed to support future health facility production enhancements.

4.6. Conclusion and Policy Recommendations

As more countries look to scale up community outreach programs, it is critical to not only pay attention to the elements that effect community productivity during program design and implementation, but also to anticipate how these factors may affect the overall health system, including health-facility production. This study concludes that diminishing returns may come into play with respect to health-facility production and overall health service utilization when facility-based staff divert too much time to community-level health outreach and provision activities. However, additional research is needed to determine what the parameters of this tipping point may be, given how important community outreach programs, in particular CHWs have proven to be in protecting the poor against CHE.[45]. Further investigation is required to inform guidelines to clarify the

[45] Finding of Paper 1 of the Author.

roles and level of effort that community-based and institutional staff can expend on community outreach activities while protecting health facility and institutional productivity. A more robust system of routine data collection and analysis is needed to monitor this balance, and enhancements to promote an enabling environment are essential to maximize CHW productivity. Given the cost of CHWs is substantial in Haiti (FHT guideline, 2017), monitoring this vital aspect of community-based health care delivery will be a key component of much needed future return on investment studies. Findings from such research will support the Ministry of Public Health and Population to determine the right balance of community and institutional staff and to improve overall performance of health facilities.

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Appendix

Table 22. Technical Efficiency, Haiti and Other LICs

Country	% of sample that is not efficient (<1)	Average score	Sample
Haiti	96.00%, CALs; 99.24%, CSLs; 99.41%, dispensaries	0.30, CALs; 0.09, CSLs; 0.04, dispensaries	79 CALs, 265 CSLs, 342 dispensaries
Burkina Faso	—	0.86	25 PHC facilities
Ethiopia	75%	0.57	60 health posts
Ghana	78%	0.88	Random selection of 86 health facilities
Guatemala	71%, but 53% have a score >0.9	0.78	34 health posts

Sources: World Bank staff, 2017; Hernandez and Sebastian 2013; Akzali et al. 2008; Sebastian and Lemma 2010; Marshall and Flessa 2011.

Note: — = not available; CAL = *Centre de santé avec lit* (health center with bed); CSL = *Centre de santé sans lit* (health center without bed), LIC = low-income country; PHC = primary health care.

Table 23. Qualitative Study: bivariate tests – sample selection and comparison

Facility	N	# Non-insti-tutional visits	# Insti-tutional. Visits	# NCHW,	# CHW	All staff Productivity	T test	Facility Staff Productivity	T test	Com-munity staff productivity	t-test
20 HF, 2016	19	*445 (1145)*	968 (*1283)*	12 (*13)*	7 (*8)*	77 (81)		97 (103)		50 (132)	
All other HF, 2016	634	*352 (1266)*	721 (*1650)*	16 (*33)*	6 (*10)*	75 (236)	t=-0.11 Df=28.27 P>0.05	73 (96)	T=-1.02 Df=18.94 P>0.05	72 (294)	T=0.61 Df=20.70 P>0.05
10 high performing, 2016	10	*828 (1508)*	1508 (*1582)*	15 (*11)*	8 (7)	114 (97)		135 (130)		86 (171)	
10 low performing, 2016	9	*19 (37)*	369 (*349)*	11 (*15)*	6 (*8)*	36 (23)	t=2.46 Df=10.11 P<0.05	56 (34)	T=1.83 Df=10.36 P<0.05	3 (5)	T=1.46 Df=8.01 P>0.05
20 HF, 2017		978 (2288)	1474 (2290)			113 (137)		121 (160)		100 (215)	
All other HF, 2017		376 (1393)	736 (1635)			77 (240)	T=-1.09 Df=21.46 P>0.05	75 (103)	T=-0.45 Df=17.66 P>0.05	74 (333)	T=-1.24 Df=18.44 P>0.05
10 high performing, 2017		1728 (3015)	2223 (2844)			163 (170)		175 (210)		153 (278)	
10 low performing, 2017		145 (262)	642 (1107)			57 (55)	T=9.49 Df=9,8 P<0.001	61 (26)	T=1.28 Df=8.7 P>0.005	31 (52)	T=1.700 Df=9.31 P>0.05
20 HF, 2018			8274 (14015)								

Notes: HF denotes health facility; NCHW denotes non-community health worker; CHW denotes community health workers