Effects of a new health financing scheme on out-of-pocket health expenditure: findings from a longitudinal household study in Yangon, Myanmar

Si Thu Thein*, May Me Thet and Ye Kyaw Aung

Strategic Information Department, Population Services International Myanmar, 16 West Shwe Gone Dine 4th Street, Bahan Township, 11201 Yangon, Myanmar

This manuscript is based on the poster number 3019 accepted at HSR 2020 conference and is intended for special supplement ‘Re-imagining health systems for better health and social justice’.

*Corresponding author. Strategic Information Department, Population Services International Myanmar, 16 West Shwe Gone Dine 4th Street, Bahan Township, 11201 Yangon, Myanmar. E-mail: stthein@psimyanmar.org

Accepted on 12 July 2021

Abstract

Since 2017, Population Services International Myanmar (PSI/Myanmar) has been running Strategic Purchasing (SP) clinics in Hlegu and Shwepyithar townships in Yangon, Myanmar. In the project, Population Services International Myanmar simulated the role of a purchaser and contracted SP clinics through a capitation payment scheme. The project aimed to reduce the health-related financial burden of poor populations in the catchment area, by having them registered under respective SP clinics for access to a package of essential health services for a minimal fixed co-payment, as a replacement for usual fee-for-service payments. Four longitudinal surveys of households registered under SP clinics were conducted in 2017, 2018 and 2019. Among 2506 registered households, 867 households sought some health care in all surveys, resulting in 3468 observations. Multivariable linear mixed-effect regression model was used to analyse the changes in out-of-pocket expenditure for health care in relation to household capacity to pay (OOPCTP). The utilization of SP clinics increased over time, and the rates were much higher in Hlegu (20.5% in baseline to 61.9% in round three) compared with those in Shwepyithar (0.2 to 7.9%). Compared with the baseline assessment, household OOPCTP decreased significantly during and after the implementation (0.76 times in round one, 0.80 in round two and 0.82 in round three; \( P < 0.001 \)). Households in Shwepyithar with less utilization of SP clinics had 1.8 times higher OOPCTP compared with those in Hlegu (1.82, 95% CI 1.58, 2.09; \( P < 0.001 \)). Household direct expenditures on care-seeking and family planning were up to 50% lower among those who used SP clinics. Our study highlighted that capitation-based health financing schemes could successfully lower out-of-pocket health expenditures among the poor. Optimal utilization of services was paramount in the successful implementation of such programmes. Therefore, for the effective scale-up of new health financing schemes, service utilization rates should be carefully monitored as one of the critical indicators.

Keywords: Out-of-pocket health expenditure, health financing, Strategic Purchasing, capitation payment, catastrophic health expenditure, Myanmar, Population Services International, PSI

Introduction

Compared with neighbouring countries in South-East Asia, Myanmar has poorer health indicators and high out-of-pocket expenditure on health. According to the World Bank report, poverty had decreased from 25.6% in 2009/2010 to 19.4% in 2015. Still, \( \sim 1.7 \) million people fell below the national poverty line due to health expenditure (World Bank Myanmar, 2017; CSO Myanmar, 2019; Ergo et al., 2019). In the Myanmar Living Conditions Survey 2017 (CSO Myanmar, 2019), the Cost of Basic Needs approach was used to estimate poverty lines for the 2015 Myanmar Poverty and Living Conditions Survey (MPLCS). The approach includes two main steps: (1) construction of the food poverty line and (2) construction of the non-food poverty line. Among recent reforms of the social and economic sectors, one of the most recent was the establishment of the new National Health Plan (NHP).

NHP aims to strengthen the country’s health system and pave the way towards universal health coverage (UHC), by selecting a path that is explicitly pro-poor. Its main goal is to provide access to a Basic Essential Package of Health Services (EPHS) to the whole country while maintaining financial protection (MOHS Myanmar, 2016). The Basic EPHS focuses on Primary Health Care and provision of this for the entire population will require integration of health service providers beyond the public sector, including private-for-profit general practitioner (GP) clinics, Ethnic Health Organizations and Non-Governmental Organizations (MOHS Myanmar, 2016).
The study included data from four longitudinal surveys of 867 poor households under a new capitation-based health financing scheme called Strategic Purchasing (SP) clinics in Myanmar from 2017 to 2019. Compared with the baseline assessment, household out-of-pocket expenditure in relation to their capacity to pay (OOPCTP) decreased significantly during and after the implementation, up to 0.76 times. Households in the area with less utilization of SP clinics had 1.8 times higher OOPCTP compared with those in other areas. Household direct expenditures on general care-seeking and family planning were up to 50% lower among those who used SP clinics. Our study highlighted that capitation-based health financing schemes could successfully lower out-of-pocket health expenditures among the poor. Proper utilization of services was paramount in the successful implementation of such programmes.

**Key messages**

- The study included data from four longitudinal surveys of 867 poor households under a new capitation-based health financing scheme called Strategic Purchasing (SP) clinics in Myanmar from 2017 to 2019.
- Compared with the baseline assessment, household out-of-pocket expenditure in relation to their capacity to pay (OOPCTP) decreased significantly during and after the implementation, up to 0.76 times.
- Households in the area with less utilization of SP clinics had 1.8 times higher OOPCTP compared with those in other areas. Household direct expenditures on general care-seeking and family planning were up to 50% lower among those who used SP clinics.
- Our study highlighted that capitation-based health financing schemes could successfully lower out-of-pocket health expenditures among the poor. Proper utilization of services was paramount in the successful implementation of such programmes.

**Strategic purchasing project**

To support Myanmar government’s movement towards UHC, Population Services International Myanmar (PSI/Myanmar) has started a pilot project on Strategic Purchasing (SP) scheme since 2017. The project has been running in two peri-urban townships, Hlegu and Shwepyithar, in Yangon region. Compared with Hlegu, Shwepyithar township is closer to downtown Yangon (the former capital of Myanmar), is more urbanized and comprises more slum areas. In this project, PSI/Myanmar simulated the role of a purchaser and contracted private GP clinics and designated them as SP clinics for the provision of a comprehensive package of primary care services to poor households in their catchment area. The aim of the project was to reduce health-related financial burden of poor people while providing quality primary care services.

PSI/Myanmar contracted SP clinic providers with a fixed capitation payment model. A capitation payment is a fixed sum of money pre-paid to the provider to manage the health care needs for all individuals registered with that provider, within the scope of an agreed package of services and over an agreed period of time (PSI Myanmar, 2017a). The package of services included family planning, communicable and non-communicable diseases, services targeting children under 5 years of age and general illness (PSI Myanmar, 2017b).

The project applied pro-poor beneficiary selection by systematically selecting poor households in the catchment areas of SP clinics within the selected townships. PSI/Myanmar issued health cards, as a proof of registration, to members from more than 2500 poor households in the catchment areas. These health cards entitled the beneficiaries to obtain the aforementioned package of health services from respective SP clinic in their vicinity, for a minimal fixed co-payment of 500 Myanmar Kyats (MMK) (~0.4 US$) per each consultation visit (PSI Myanmar, 2017c).

In this capitation payment model, PSI/Myanmar simulated the role of a purchaser, where there was previously none. Prior to the project implementation, the poor households could either go to the public-sector health centres for free health care, albeit with long wait times, or to private-sector health providers (drug shops, GP clinics, private hospitals, etc.) and pay out of pocket. With this capitation payment model, PSI/Myanmar aimed to reduce out-of-pocket health expenditure (OOP) of the beneficiaries. The minimal co-payment was added to reduce moral hazard, while keeping the consultation fees much lower than the usual rates around 3000 to 4000 MMK (~2.5–3.5 US$).

Since the project’s aim was to reduce health-related financial burden of poor households, the key outcome variables were based on households’ economic capacity and their spending on health. Technically, these were measured in terms of household OOP and the proportion of OOP shared on the household capacity to pay (CTP).

**Rationale of the study**

Past research found that financial protection schemes for households could lead to reduced out-of-pocket payment and prevent impoverishment due to health spending (Devadasan et al., 2007; Kusi et al., 2015). On the other hand, there are sources citing that capitation-based systems could lead to cost savings from the provider perspective and yet may result in reduced service quality and satisfaction (Aguye-Baffour et al., 2013; Sándor et al., 2016; Andoh-Adjei et al., 2018). While the providers may be happy with the capitation payment schemes, the beneficiaries may not use the services to the full potential.

To our knowledge, there was no published literature on the effect of capitation-based health financing scheme on household financial burden in Myanmar. For this reason, PSI/Myanmar designed the project with built-in implementation research component from the very beginning. This study was a part of that implementation research component. The study aimed to identify the effect of the new health financing scheme on the beneficiary households, primarily in terms of their health service expenditure and health-related financial burden over the project period in two project townships.

**Methodology**

The study deployed a longitudinal design conducted among the households of registered beneficiaries. The baseline survey was conducted in the beginning of the project (the time of household registration for issuing health cards) at the end of 2017. The inclusion criteria for the baseline survey were that the household must have at least one member who had an ailment and/or one who had sought a family planning or fertility service, within 1 month prior to the survey. Among 2506 households with issued health cards, 1652 households met the inclusion criteria and participated in the baseline survey. All 1652 households in the baseline survey were then used as the sampling frame for follow-up surveys at 6 months (round 1), 1 year (round 2) and 2 years (round 3) afterwards. The same inclusion criteria as the baseline were used in these follow-up rounds, and the numbers of households followed-up were 1473 (round 1), 1271 (round 2) and 1284 (round 3).

The questionnaire was developed by PSI/Myanmar by integrating inputs from several key stakeholders, including international health financing specialists, and members of NHP implementation unit, Ministry of Health and Sports, Myanmar. In the questionnaire, the household expenditure...
section was adapted from World Health Survey 2003 (World Health Organization, 2003). The questionnaire had two main sections on health-seeking behaviours: questions for household members who fell sick during the past month and those for women of reproductive age for fertility and family-planning services. These sections covered types of providers, cost of service, time to treatment and source of payment for service fees. Household characteristics such as household member roster, household asset and income information were also collected from every household. For all households, asset-based wealth quintiles were calculated within the sample and also against the national wealth quintiles by using the standard weights and cut-off points from 2014 Myanmar Housing and Population Census (Department of Population, 2014).

Data analysis was conducted using Stata version 14.2 and R version 4.0.3 (R Core Team, 2020). For this study, the data from four survey rounds were filtered to include only those households that met eligibility criteria in all four rounds. Therefore, the final dataset for analysis included only 867 households with a total of 3468 observations (four observations for each household). Basic household characteristics such as characteristics of household head, household member rosters and asset-based wealth quintiles were assumed as constant from the baseline throughout the survey rounds. These were described using mean and standard deviations for continuous variables and using numbers and percentages for categorical ones. The differences between the geographical areas (townships) in terms of these characteristics were tested using t-test for continuous variables and chi-squared test for categorical ones.

For household monthly expenditures, health financing indicators at household-level and SP clinic visits, household-level aggregation was calculated first by taking the averages for each household over four survey rounds for continuous variables and by logical combination for dummy variables. As the expenditure variables did not follow normal distribution, the summaries were shown using median values with interquartile range (IQR) for continuous variables and using numbers and percentages for categorical variables. Likewise, differences in household-level summaries between the two townships were tested using the Wilcoxon Rank Sum test for the continuous variables.

These expenditure figures and related indicators were also tracked across four survey rounds, using median (IQR) values and percentages, respectively. The changes in each indicator across survey rounds were tested using Friedman’s test for each township and for the combined sample.

**Assessment of household financial burden for health**

In our study, OOP referred to all expenditures directly incurred by households at any point where they received health services. A typical OOP might include direct care-seeking expenditure of doctors’ consultation fees, medication purchases and spending on alternative and/or traditional medicine at the primary care level but excluded health-related transportation and special nutrition expenditures. Health-related transportation was considered as indirect expenditure for the said services.

The proportion of OOP shared on household CTP were explored according to WHO Health System Financing discussion paper (World Health Organization, 2005). All the variables related to expenditure were calculated using monthly figures. The household’s CTP was defined as the non-subsistence effective income of the household and calculated using the following formula:

\[
\text{CTP} = \text{EXP} - \text{SE} \quad \text{if SE} \leq \text{FOOD}
\]

\[
\text{CTP} = \text{EXP} - \text{FOOD} \quad \text{if SE} > \text{FOOD}, \text{ where,}
\]

\[
\text{EXP} = \text{All household expenditure comprised both monetary and in-kind payment on all goods and services.}
\]

\[
\text{SE} = \text{Household subsistence spending, the minimum requirement to maintain basic life in a society.}
\]

For estimating household subsistence, a food-share-based poverty line was used, which was defined as the food expenditure of the household whose food expenditure share of total household expenditure within the 45th and 55th percentile of the total sample.

\[
\text{FOOD} = \text{Household food expenditure spent on all food-stuffs by the household plus the value of family’s own food production consumed within the household (excluding expenditure on alcoholic beverages, tobacco and food consumption outside the home, e.g. hotel and restaurants).}
\]

Then, the burden of health payments was defined as the out-of-pocket payments as a proportion of the household’s OOPCTP, calculated as follows:

\[
\text{OOPCTP} = \frac{\text{OOP}}{\text{CTP}}
\]

When OOPCTP became equal or exceed 0.4, the household was categorized as having catastrophic health expenditure (CHE). In addition, household impoverishment (impoor) meant that a non-poor household became impoverished by health payments. The variable (impoor) was created by

\[
\text{impoor} = 1 \quad \text{if EXP} \geq \text{SE} \text{ and EXP} - \text{OPE} < \text{SE}
\]

\[
\text{impoor} = 0 \quad \text{if EXP} \geq \text{SE} \text{ and EXP} - \text{OPE} \geq \text{SE}
\]

**Regression modelling**

As the study included serial longitudinal assessments of the same households over time, the main outcome variables of the study and their potential influencing factors were modelled using multivariable linear mixed-effects regression to account for longitudinal data. Mixed-effects regression allowed modelling for both fixed and random effects for longitudinal data by considering within-individual and between-individual variance. Three outcome variables (OOPCTP, direct expenditure for general care-seeking and direct expenditure for family planning) were separately modelled using nlme package in R (Pinheiro et al., 2020). Unique household codes were used to model random effects, while other covariates such as household characteristics, SP clinic visits and survey rounds were kept as fixed effects in each model.

For all three models, the outcome variables were tested for normality and then log-10 transformed. Therefore, the estimates and confidence intervals (CI) from the models were exponentiated and shown as adjusted ratios between the reference level and terms. Unadjusted ratios were also shown by using linear regression on log-10 transformed outcome variable against each covariate.
Fell in richer wealth quintile groups than those in Hlegu (37.8% vs. 0.3% for the richest sample quintiles, \( P < 0.001 \) and 23.8% vs 0.5% for the richest national quintiles, \( P < 0.001 \)).

**Household expenditures and health financing indicators**

Table 2 showed household-level summaries from all survey rounds including various household expenditures figures from the previous month, several health financing indicators and visits to SP clinics. All expenditures were described as median values with IQR in local currency (MMK, 1 US$ = 1500 MMK). Overall, most expenditure figures were significantly higher among the households from Shwepyithar township than those from Hlegu (e.g. total household expenditure 259 137.5 vs 242 718.8, \( P = 0.04 \); food expenditure 259 137.5 vs 242 718.8, \( P = 0.04 \); indirect expenditure 259 137.5 vs 242 718.8, \( P = 0.04 \); total health expenditure 4000.0 vs 2375.0, \( P < 0.001 \)). The only exceptions were non-food expenditure (\( P = 0.55 \)), indirect expenditure for care-seeking (\( P = 0.39 \)) and indirect health expenditure (\( P = 0.92 \)).

On most household health financing indicators such as household CTP, household poverty, CHE, and household impoverishment, there was no evidence of significant difference among two townships. However, there was a statistically significant difference in the proportion of OOP as the share of CTP (OOPCTP), 0.02 in Hlegu vs 0.03 in Shwepyithar (\( P < 0.001 \)).

There was a marked difference in utilization of SP clinic services between the two townships, for either general care-seeking or family planning. During the survey rounds, up to 83.1% of surveyed households in Hlegu made at least one visit to SP clinics within the past month but only 18.5% of those in Shwepyithar did so (\( P < 0.001 \)). The pattern was consistent for general care-seeking (74.2% vs 12.7%, \( P < 0.001 \)) and for family planning (49.7 vs 9.6%, \( P < 0.001 \)).

### Ethical considerations

The study was approved by the authors’ institute as well as the local ethical review committee in Myanmar. All ethical considerations such as respect for autonomy and privacy, non-maleficence and justice were in place throughout the design and implementation of the study. All participants gave written informed consent for the study.

### Results

Table 1 described the characteristics of 867 studied households, including the characteristics of the household head, total number of household members and household wealth quintiles. There were statistically significant differences in all household characteristics between the two townships (\( P < 0.05 \)). The average age of household head was slightly younger in Hlegu township compared with those in Shwepyithar (41.3 years vs 43.1 years, \( P = 0.04 \)), and the average total number of household members was slightly lower among those in Hlegu township (4.7 vs 5.1, \( P = 0.003 \)). Also, the education levels of household heads were generally lower among those in Hlegu township (45.2%, \( P = 0.002 \)). In contrast, there were more male-headed households in Hlegu (89.4 vs 82.6%, \( P = 0.004 \)).

Regarding socio-economic status, the employment status and occupations of household heads in Shwepyithar were worse than those in Hlegu. There were more households with unemployed household heads in Shwepyithar than in Hlegu (22.1 vs 13.9%, \( P < 0.001 \)) and less household heads with skilled work as an occupation (10.6 vs 30.6%, \( P < 0.001 \)). However, asset-based wealth quintiles showed a different distribution pattern, in both within-sample calculations and national reference calculations. Households in Shwepyithar fell in richer wealth quintile groups than those in Hlegu (37.8% vs 0.3% for the richest sample quintiles, \( P < 0.001 \) and 23.8% vs 0.5% for the richest national quintiles, \( P < 0.001 \)).

**Table 1. Household characteristics**

| Characteristics                        | Category             | Hlegu (n = 396) | Shwepyithar (n = 471) | Total (n = 867) | P-value* |
|----------------------------------------|----------------------|----------------|-----------------------|----------------|---------|
| Age of household head                  | Mean (SD)            | 41.32 (12.7)   | 43.14 (12.93)         | 42.31 (12.85)  | 0.04    |
| Number of household members            | Mean (SD)            | 4.72 (1.86)    | 5.11 (1.88)           | 4.93 (1.88)    | 0.003   |
| Gender of household head               | Male                 | 354 (89.4%)    | 389 (82.6%)           | 743 (85.7%)    | 0.004   |
| Education of household head            | Primary school and below | 226 (57.1%)   | 213 (45.2%)           | 439 (50.6%)    | 0.002   |
| Occupation of household head           | Unemployed           | 55 (13.9%)     | 104 (22.1%)           | 159 (18.3%)    | <0.001  |
| Household wealth quintile (sample)     | 1 (Poorest)          | 141 (35.6%)    | 0 (0.0%)              | 141 (16.3%)    | <0.001  |
|                                         | 2 (Second poorest)   | 177 (44.7%)    | 0 (0.0%)              | 177 (20.4%)    |         |
|                                         | 3 (Middle)           | 75 (18.9%)     | 101 (21.4%)           | 176 (20.3%)    |         |
|                                         | 4 (Second richest)   | 2 (0.5%)       | 192 (40.8%)           | 194 (22.4%)    |         |
|                                         | 5 (Richest)          | 1 (0.3%)       | 178 (37.8%)           | 179 (20.6%)    |         |
| Household wealth quintile (national)** | 1 + 2 (Poor and poorest) | 174 (43.9%)  | 34 (7.2%)             | 208 (24.0%)    | <0.001  |
|                                         | 3 (Middle)           | 142 (35.9%)    | 123 (26.1%)           | 265 (30.6%)    |         |
|                                         | 4 (Second richest)   | 78 (19.7%)     | 202 (42.9%)           | 280 (32.3%)    |         |
|                                         | 5 (Richest)          | 2 (0.5%)       | 112 (23.8%)           | 114 (13.1%)    |         |

*P-values were from t-test for continuous variables and from chi-squared test for categorical variables.

**Table 2. Household expenditures and health financing indicators**

| Expenditure Category | Hlegu (n = 396) | Shwepyithar (n = 471) | Total (n = 867) | P-value |
|----------------------|----------------|-----------------------|----------------|---------|
| Food expenditure     | 259 137.5     | 242 718.8             | 245 036.7      | 0.04    |
| Total health expenditure | 4000.0    | 2375.0               | 3175.0         | <0.001  |
| Non-food expenditure | 123 261.6    | 265 306.2             | 388 567.8      | 0.55    |
| Indirect expenditure | 208 240.0    | 265 306.2             | 573 546.2      | 0.39    |

Ethical considerations

The study was approved by the authors’ institute as well as the local ethical review committee in Myanmar. All ethical considerations such as respect for autonomy and privacy, non-maleficence and justice were in place throughout the design and implementation of the study. All participants gave written informed consent for the study.
Table 2. Average household expenditures, health financing indicators and SP clinic visits

| Characteristics group | Characteristics<sup>c</sup> | Indicator type | Hlegu (n = 396) | Shwepyithar (n = 471) | Total (n = 867) | P-value<sup>a</sup> | Significance<sup>b</sup> |
|-----------------------|-----------------------------|----------------|----------------|----------------------|----------------|-----------------|-------------------|
| Total household expenditure | Total household expenditure | Median (IQR) | 242 718.80 (121 171.88) | 259 137.50 (118 693.75) | 250 287.50 (121 256.25) | 0.04 | * |
| Non-health expenditure | Food expenditure | Median (IQR) | 120 000.00 (48 000.00) | 131 250.00 (48 125.00) | 126 250.00 (45 000.00) | <0.001 | *** |
| | Non-food expenditure | Median (IQR) | 121 493.80 (81 025.00) | 117 125.00 (70 831.25) | 119 625.00 (75 637.30) | 0.55 | ns |
| | Food expenditure proportion | Median (IQR) | 0.51 (0.122) | 0.54 (0.125) | 0.52 (0.128) | <0.001 | *** |
| Health expenditure | Total expenditure for family planning | Median (IQR) | 750.00 (775.00) | 862.50 (1243.75) | 775.00 (956.25) | 0.04 | * |
| | Total expenditure for care-seeking | Median (IQR) | 1500.00 (2731.25) | 2750.00 (4625.00) | 2025.00 (3862.50) | <0.001 | *** |
| | Health expenditure proportion | Median (IQR) | 2375.00 (2753.12) | 4000.00 (5212.50) | 3237.50 (4225.00) | <0.001 | *** |
| | Food expenditure | Median (IQR) | 0.010 (0.012) | 0.017 (0.020) | 0.013 (0.017) | <0.001 | *** |
| Direct health expenditure | Direct expenditure for family planning | Median (IQR) | 500.00 (590.62) | 625.00 (1000.00) | 575.00 (800.00) | 0.02 | * |
| | Direct expenditure for care-seeking | Median (IQR) | 1212.50 (2250.00) | 2500.00 (4250.00) | 1750.00 (3237.50) | <0.001 | *** |
| | Direct health expenditure | Median (IQR) | 1862.50 (2450.00) | 3375.00 (4562.50) | 2625.00 (3637.50) | <0.001 | *** |
| Indirect health expenditure | Indirect expenditure for family planning | Median (IQR) | 125.00 (431.25) | 125.00 (612.50) | 125.00 (500.00) | 0.39 | ns |
| | Indirect expenditure for care-seeking | Median (IQR) | 125.00 (431.25) | 125.00 (612.50) | 125.00 (500.00) | 0.39 | ns |
| | Indirect health expenditure | Median (IQR) | 187.50 (531.25) | 250.00 (750.00) | 200.00 (625.00) | 0.92 | ns |
| Health financing indicators | Household CTP | Median (IQR) | 140 884.90 (92 107.97) | 146 227.80 (93 633.26) | 143 721.30 (93 356.86) | 0.28 | ns |
| | Household poverty | n (column %) | 46 (11.6%) | 58 (12.3%) | 104 (12%) | 0.75 | ns |
| | CHE | n (column %) | 11 (2.8%) | 17 (3.6%) | 28 (3.2%) | 0.56 | ns |
| | Household impoverishment | n (column %) | 3 (0.9%) | 6 (1.5%) | 9 (1.2%) | 0.33 | ns |
| | OOPCTP | Median (IQR) | 0.03 (0.024) | 0.03 (0.042) | 0.03 (0.033) | <0.001 | *** |
| SP clinic visits with last month | Any family planning at SP clinic | n (column %) | 197 (49.7%) | 45 (9.6%) | 242 (27.9%) | <0.001 | *** |
| | Any care-seeking at SP clinic | n (column %) | 294 (74.2%) | 60 (12.7%) | 354 (40.8%) | <0.001 | *** |
| | Any visit to SP clinic | n (column %) | 329 (83.1%) | 87 (18.5%) | 416 (48.0%) | <0.001 | *** |
| | Total family planning visits to SP clinic | Median (IQR) | 0.00 (0.30) | 0.00 (0.00) | 0.00 (0.25) | <0.001 | *** |
| | Total care-seeking visits to SP clinic | Median (IQR) | 0.50 (0.75) | 0.00 (0.00) | 0.00 (0.50) | <0.001 | *** |
| | Total SP clinic visits | Median (IQR) | 0.75 (0.75) | 0.00 (0.00) | 0.00 (0.75) | <0.001 | *** |

<sup>a</sup>P-values were from Wilcoxon test for continuous variables and from chi-squared test for categorical variables.

<sup>b</sup>ns = statistically not significant, * = P<0.05, ** = P<0.01, *** = P<0.001.

<sup>c</sup>All expenditures shown were those of previous month in MMK. 1 US$ ∼1500 MMK at the time of survey.
Table 3. Average household expenditures, health financing indicators and SP clinic visits across survey rounds

| Characteristics group | Characteristics | Township | Indicator type | Baseline ($n = 867$) | Round 1 ($n = 867$) | Round 2 ($n = 867$) | Round 3 ($n = 867$) | P-value$^a$ | Significance$^b$ |
|-----------------------|-----------------|----------|----------------|----------------------|---------------------|---------------------|---------------------|------------|----------------|
| **Total household expenditure** | Total household expenditure | Hlegu | Median (IQR) | 209 675.00 (131 275.00) | 228 050.00 (127 137.50) | 236 900.00 (129 150.00) | 266 250.00 (190 187.50) | <0.001 | *** |
| | | Shwepyithar | Median (IQR) | 216 000.00 (126 595.00) | 237 000.00 (125 000.00) | 259 500.00 (160 500.00) | 288 500.00 (170 000.00) | <0.001 | *** |
| | | Total | Median (IQR) | 214 200.00 (129 875.00) | 233 400.00 (125 975.00) | 248 900.00 (145 450.00) | 276 500.00 (177 500.00) | <0.001 | *** |
| **Non-health expenditure** | Food expenditure | Hlegu | Median (IQR) | 111 000.00 (45 500.00) | 115 450.00 (60 000.00) | 120 000.00 (77 600.00) | 150 000.00 (60 000.00) | <0.001 | *** |
| | | Shwepyithar | Median (IQR) | 120 000.00 (60 000.00) | 120 000.00 (60 000.00) | 120 000.00 (60 000.00) | 150 000.00 (60 000.00) | <0.001 | *** |
| | | Total | Median (IQR) | 120 000.00 (60 000.00) | 120 000.00 (60 000.00) | 120 000.00 (60 000.00) | 150 000.00 (60 000.00) | <0.001 | *** |
| **Non-food expenditure** | Food expenditure proportion | Hlegu | Median (IQR) | 0.517 (0.203) | 0.490 (0.184) | 0.528 (0.210) | 0.509 (0.220) | <0.001 | *** |
| | | Shwepyithar | Median (IQR) | 0.565 (0.206) | 0.528 (0.190) | 0.547 (0.218) | 0.515 (0.174) | <0.001 | *** |
| | | Total | Median (IQR) | 0.538 (0.208) | 0.512 (0.193) | 0.537 (0.213) | 0.514 (0.199) | <0.001 | *** |
| **Health expenditure** | Total expenditure for family planning | Hlegu | Median (IQR) | 800.00 (1115.00) | 600.00 (1000.00) | 500.00 (1000.00) | 600.00 (1000.00) | 0.05 | ns |
| | | Shwepyithar | Median (IQR) | 750.00 (1500.00) | 500.00 (1500.00) | 500.00 (1500.00) | 500.00 (1500.00) | 0.19 | ns |
| | | Total | Median (IQR) | 800.00 (1500.00) | 500.00 (1500.00) | 600.00 (1500.00) | 600.00 (1400.00) | 0.05 | ns |
| | Care-seeking | Hlegu | Median (IQR) | 0.00 (3500.00) | 0.00 (2862.50) | 0.00 (2262.50) | 1000.00 | 0.08 | ns |
| | | Shwepyithar | Median (IQR) | 0.00 (5000.00) | 0.00 (3500.00) | 500.00 (6000.00) | 300.00 (3000.00) | 0.02 | * |
| | | Total | Median (IQR) | 0.00 (4000.00) | 300.00 (3000.00) | 500.00 (4000.00) | 1000.00 | <0.001 | *** |
| **Total health expenditure** | Health expenditure proportion | Hlegu | Median (IQR) | 1500.00 (3415.00) | 1875.00 (2675.00) | 1500.00 (2712.50) | 1500.00 (2272.50) | 0.75 | ns |
| | | Shwepyithar | Median (IQR) | 2000.00 (5250.00) | 2000.00 (4300.00) | 2500.00 (6100.00) | 3000.00 (5600.00) | 0.009 | * |
| | | Total | Median (IQR) | 1850.00 (4800.00) | 2000.00 (3300.00) | 2000.00 (4175.00) | 2000.00 (3700.00) | 0.18 | ns |
| **Health expenditure proportion** | Shwepyithar | Median (IQR) | 0.010 (0.027) | 0.008 (0.019) | 0.010 (0.025) | 0.010 (0.019) | 0.34 | ns |
| | Total | Median (IQR) | 0.009 (0.022) | 0.008 (0.015) | 0.008 (0.017) | 0.007 (0.014) | 0.03 | * |
|                      | Hlegu Median (IQR) | Shwepyithar Median (IQR) | Total Median (IQR) |
|----------------------|--------------------|--------------------------|-------------------|
| **Direct health**    |                    |                          |                   |
| expenditure          |                    |                          |                   |
| for family planning  |                    |                          |                   |
| Hlegu                | 800.00 (1115.00)   | 750.00 (1500.00)         | 800.00 (1500.00)  |
|                      | 500.00 (1000.00)   | 500.00 (1500.00)         | 500.00 (1500.00)  |
|                      | 500.00 (1000.00)   | 500.00 (1000.00)         | 500.00 (1500.00)  |
|                      | 0.00 (0.00)        | 0.00 (0.00)              | 0.00 (0.00)       |
|                      | <0.001             | <0.001                   | <0.001            |
| **Direct expenditure**|                    |                          |                   |
| for care-seeking     |                    |                          |                   |
| Hlegu                | 1000.00 (2000.00)  | 2000.00 (4000.00)        | 1500.00 (4800.00) |
|                      | 1000.00 (1300.00)  | 1650.00 (4000.00)        | 1850.00 (4800.00) |
|                      | 1500.00 (2300.00)  | 1650.00 (4000.00)        | 1850.00 (4800.00) |
|                      | 500.00 (1500.00)   | 2500.00 (5725.00)        | 750.00 (3500.00)  |
|                      | 0.00 (0.00)        | 2000.00 (4500.00)        | 0.00 (3000.00)    |
|                      | <0.001             | <0.001                   | <0.001            |
| **Indirect health**  |                    |                          |                   |
| expenditure          |                    |                          |                   |
| for family planning  |                    |                          |                   |
| Hlegu                | 0.00 (0.00)        | 0.00 (0.00)              | 0.00 (0.00)       |
|                      | 0.00 (0.00)        | 0.00 (0.00)              | 0.00 (0.00)       |
|                      | 0.00 (0.00)        | 0.00 (0.00)              | 0.00 (0.00)       |
|                      | 0.00 (0.00)        | 0.00 (0.00)              | 0.00 (0.00)       |
|                      | <0.001             | <0.001                   | <0.001            |
| **Indirect expenditure**|                |                          |                   |
| for care-seeking     |                    |                          |                   |
| Hlegu                | 0.00 (4000.00)     | 2000.00 (5250.00)        | 0.00 (4000.00)    |
|                      | 0.00 (2700.00)     | 1650.00 (4000.00)        | 2000.00 (5250.00) |
|                      | 1500.00 (3415.00)  | 1500.00 (2300.00)        | 1500.00 (3415.00) |
|                      | 0.00 (0.00)        | 2500.00 (5725.00)        | 750.00 (3500.00)  |
|                      | 500.00 (1500.00)   | 2000.00 (4500.00)        | 0.00 (3000.00)    |
|                      | <0.001             | <0.001                   | <0.001            |
| **Health financing** |                      |                          |                   |
| indicators           |                    |                          |                   |
| Household CTP        |                    |                          |                   |
| Hlegu                | 112 780.56 (104 125.00) | 132 229.94 (110 553.96) | 121 629.62 (110 872.38) |
|                      | 132 229.94 (110 553.96) | 121 629.62 (110 872.38) | 150 000.00 (151 627.62) |
|                      | 121 629.62 (110 872.38) | 150 000.00 (151 627.62) | 150 000.00 (151 627.62) |
|                      | 150 000.00 (151 627.62) | 150 000.00 (151 627.62) | 150 000.00 (151 627.62) |
|                      | <0.001             | <0.001                   | <0.001            |
| Household poverty    |                      |                          |                   |
| Hlegu                | 26 (6.6%)          | 17 (4.3%)                | 26 (6.6%)         |
|                      | 8 (2.0%)           | 8 (2.0%)                 | 8 (2.0%)          |
|                      | 17 (4.3%)          | 17 (4.3%)                | 26 (6.6%)         |
|                      | 8 (2.0%)           | 8 (2.0%)                 | 8 (2.0%)          |
|                      | <0.001             | <0.001                   | <0.001            |
|                       | ns                 | ns                       | ns                |

(continued)
| Characteristics group | Characteristics | Township  | Indicator type | Baseline $(n = 867)$ | Round 1 $(n = 867)$ | Round 2 $(n = 867)$ | Round 3 $(n = 867)$ | P-value$^a$ | Significance$^b$ |
|-----------------------|----------------|----------|----------------|----------------------|---------------------|---------------------|---------------------|------------|----------------|
| CHE                   |                | Hlegu    | n (column %)   | 4 (1.0%)             | 6 (1.5%)            | 0 (0.0%)            | 3 (0.8%)            | 0.14       | ns             |
|                       |                | Shwepyithar | n (column %)   | 2 (0.4%)             | 8 (1.7%)            | 5 (1.1%)            | 3 (0.6%)            | 0.21       | ns             |
|                       |                | Total    | n (column %)   | 6 (0.7%)             | 14 (1.6%)           | 5 (0.6%)            | 6 (0.7%)            | 0.08       | ns             |
| Household impoverishment |                | Hlegu    | n (column %)   | 2 (0.5%)             | 1 (0.3%)            | 1 (0.3%)            | 0 (0.0%)            | 0.42       | ns             |
|                       |                | Shwepyithar | n (column %)   | 4 (0.9%)             | 0 (0.0%)            | 4 (0.9%)            | 0 (0.0%)            | 0.03       | *              |
|                       |                | Total    | n (column %)   | 6 (0.7%)             | 1 (0.1%)            | 5 (0.6%)            | 0 (0.0%)            | 0.02       | *              |
| OOPCTP                |                | Hlegu    | Median (IQR)   | 0.016 (0.037)        | 0.011 (0.019)       | 0.010 (0.019)       | 0.011 (0.019)       | <0.001     | ***            |
|                       |                | Shwepyithar | Median (IQR)   | 0.022 (0.051)        | 0.015 (0.035)       | 0.018 (0.041)       | 0.018 (0.033)       | 0.009      | *              |
|                       |                | Total    | Median (IQR)   | 0.018 (0.045)        | 0.013 (0.023)       | 0.014 (0.031)       | 0.014 (0.028)       | <0.001     | ***            |
| SP clinic visits with last month | Any family planning at SP clinic | Hlegu    | n (column %)   | 47 (11.9%)           | 60 (15.2%)          | 136 (34.3%)         | 109 (27.5%)         | <0.001     | ***            |
|                       |                | Shwepyithar | n (column %)   | 0 (0.0%)             | 25 (5.3%)           | 26 (5.5%)           | 21 (4.5%)           | <0.001     | ***            |
|                       |                | Total    | n (column %)   | 47 (5.4%)            | 85 (19.8%)          | 162 (18.7%)         | 130 (15.0%)         | <0.001     | ***            |
|                       |                | Hlegu    | Median (IQR)   | 0.00 (0.00)          | 0.00 (0.00)         | 0.00 (1.00)         | 0.00 (1.00)         | <0.001     | ***            |
|                       |                | Shwepyithar | Median (IQR)   | 0.00 (0.00)          | 0.00 (0.00)         | 0.00 (0.00)         | 0.00 (0.00)         | <0.001     | ***            |
|                       |                | Total    | Median (IQR)   | 0.00 (0.00)          | 0.00 (0.00)         | 0.00 (1.00)         | 1.00 (1.00)         | <0.001     | ***            |
|                       |                | Hlegu    | Median (IQR)   | 0.00 (0.00)          | 0.00 (0.00)         | 0.00 (0.00)         | 0.00 (0.00)         | <0.001     | ***            |
|                       |                | Shwepyithar | Median (IQR)   | 0.00 (0.00)          | 0.00 (1.00)         | 0.00 (1.00)         | 0.00 (1.00)         | <0.001     | ***            |
|                       |                | Total    | Median (IQR)   | 0.00 (0.00)          | 0.00 (1.00)         | 1.00 (2.00)         | 1.00 (2.00)         | <0.001     | ***            |
| Total SP clinic visits | Any care-seeking at SP clinic | Hlegu    | n (column %)   | 81 (20.5%)           | 172 (43.4%)         | 249 (62.9%)         | 245 (61.9%)         | <0.001     | ***            |
|                       |                | Shwepyithar | n (column %)   | 1 (0.2%)             | 37 (7.9%)           | 15 (3.2%)           | 24 (5.1%)           | <0.001     | ***            |
|                       |                | Total    | n (column %)   | 43 (5.0%)            | 171 (19.7%)         | 204 (23.5%)         | 226 (26.1%)         | <0.001     | ***            |
|                       |                | Hlegu    | Median (IQR)   | 0.00 (0.00)          | 0.00 (0.00)         | 0.00 (1.00)         | 0.00 (1.00)         | <0.001     | ***            |
|                       |                | Shwepyithar | Median (IQR)   | 0.00 (0.00)          | 0.00 (1.00)         | 0.00 (1.00)         | 0.00 (1.00)         | <0.001     | ***            |
|                       |                | Total    | Median (IQR)   | 0.00 (0.00)          | 0.00 (1.00)         | 1.00 (1.00)         | 1.00 (1.00)         | <0.001     | ***            |

$^a$ P-values were from Friedman test for continuous variables and from chi-squared test for categorical variables.

$^b$ ns = statistically not significant, $^* = P < 0.05$, $^{**} = P < 0.01$, $^{***} = P < 0.001$.

All expenditures shown were in MMK. 1 US$ ∼ 1500 MMK at the time of survey.
Figure 1. Trends in median household expenditures across survey rounds

Table 3 detailed the trend of all expenditure figures and SP clinic visits across four survey rounds. All the calculations were done separately for each township and the total. Friedman’s test was used for significance testing for differences among the rounds. Overall, there were significant increasing trends in household total expenditures and non-health expenditures in both townships. In contrast, there was no such significant difference for health expenditures except for care-seeking expenditure ($P < 0.001$) and total health expenditure in Shwepyithar township ($P = 0.009$). Total direct health expenditure was on a significant downward trend (from 1850 MMK in baseline to 750 MMK in round three, $P < 0.001$). The reductions were more apparent in Hlegu township (from 1500 MMK to 500 MMK, $P < 0.001$). The trends of selected expenditure indicators across survey rounds were shown in Figure 1.

There were significant differences in household health financing indicators across survey rounds (Table 3). Household CTP was on slightly upward trend ($P < 0.001$). Household poverty and impoverishment indicators fluctuated between the assessments ($P < 0.001$), but no such difference was observed for CHE ($P = 0.08$). All OOPCTP numbers showed downward trends across survey rounds ($P < 0.001$ for Hlegu and total, $P = 0.009$ for Shwepyithar). The trends of selected expenditure indicators across survey rounds were shown in Figure 1.

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There were significant upward trends on SP clinic visits within past month for all occasions across survey rounds. The rise was more notable in general care-seeking where 26.1% of all surveyed households reported that they made at least one visit to SP clinic within the past month in round three, while only 5.0% did so in baseline ($P < 0.001$). For family-planning visit, the increase was more modest, from 5.4% in baseline to 15.0% in round three ($P < 0.001$). Similar to the summary figures in Table 2, utilization rates of SP clinics were consistently higher in Hlegu township compared with that in Shwepyithar (from 20.5% in baseline to 61.9% in round three for Hlegu vs 0.2% in baseline to 7.9% in round three for Shwepyithar).

Results from linear mixed-effect regression models

Table 4 displayed the results of unadjusted estimates (UE) and adjusted estimates (AE) along with 95% CI from various regression models. As detailed in the methods section, three separate linear mixed-effect regression models were run for three outcome variables: (1) OOPCTP, (2) household direct expenditure for general care-seeking and (3) household direct expenditure for family planning. In all adjusted models, household geographic location (township), characteristics of household and household head and any SP clinic visits were model as fixed effects. The change in outcome variable across survey rounds compared with the baseline was included in the model as a fixed effect. The fixed effects from all adjusted models are summarized in Figure 2.

In adjusted regression model for OOPCTP, household from Shwepyithar was found to incur significantly higher OOPCTP compared with those in Hlegu (1.82 times, 95% CI 1.58, 2.09; $P < 0.001$). In contrast, OOPCTP was significantly lower in households with a higher number of total household members (0.92 times, 95% CI 0.90, 0.95; $P < 0.001$). Households with skilled workers as the household head had significantly lower OOPCTP compared with those with unemployed household head (0.81 times, 95% CI 0.66, 0.99; $P < 0.05$). Also, households in richer wealth quintiles had significantly lower OOPCTP compared with those in poorer quintiles (0.78 times, 95% CI 0.66, 0.92; $P < 0.01$ for Quintile 4; 0.77 times, 95% CI 0.62, 0.95; $P < 0.05$ for Quintile 5). Compared with the baseline, OOPCTP was significantly lower in all three follow-up rounds (0.76, 0.80 and 0.82 times, $P < 0.001$).
**Table 4.** Unadjusted and adjusted estimates from linear mixed-effect regression models

| Model terms                        | LME (OOPCTP)             | LME (direct care-seeking expenditure) | LME (direct family-planning expenditure) |
|------------------------------------|--------------------------|---------------------------------------|------------------------------------------|
|                                    | UE (95% CI)              | AE (95% CI)                           | UE (95% CI)                              |
| (Intercept)                        | –                        | 0.033 (0.026, 0.043)                  | –                                        |
| Township (Hlegu)                   | 1.00 (Ref)               | 1.00 (Ref)                            | 1.00 (Ref)                               |
| Township (Shwepyithar)             | 1.50 (1.32, 1.71)***     | 1.82 (1.58, 2.09)***                  | 2.04 (1.71, 2.42)***                     |
| Total household members            | 0.95 (0.92, 0.98)*       | 0.92 (0.90, 0.95)*                    | 1.09 (1.04, 1.14)***                     |
| Age (year)                         | 1.00 (0.99, 1.00)        | 1.00 (1.00, 1.01)                     | 1.02 (1.01, 1.02)***                     |
| Gender (male)                      | 1.00 (Ref)               | 1.00 (Ref)                            | 1.00 (Ref)                               |
| Gender (female)                    | 1.13 (0.93, 1.36)        | 1.04 (0.88, 1.24)                     | 1.08 (0.84, 1.39)                        |
| Education (primary school and below) | 1.00 (Ref)             | 1.00 (Ref)                            | 1.00 (Ref)                               |
| Education (middle to high school)  | 1.05 (0.92, 1.20)        | 0.94 (0.84, 1.05)                     | 1.15 (0.96, 1.38)                        |
| Education (above high school)      | 0.94 (0.62, 1.43)        | 0.76 (0.54, 1.07)                     | 1.09 (0.59, 2.01)                        |
| Occupation (unemployed)            | 1.00 (Ref)               | 1.00 (Ref)                            | 1.09 (0.59, 2.01)                        |
| Occupation (unskilled)             | 0.80 (0.68, 0.96)*       | 0.86 (0.72, 1.03)                     | 0.67 (0.53, 0.85)***                     |
| Occupation (skilled)               | 0.71 (0.57, 0.87)*       | 0.81 (0.66, 0.99)*                    | 0.57 (0.43, 0.75)***                     |
| National Wealth Quantile (1 + 2)   | 1.00 (Ref)               | 1.00 (Ref)                            | 1.00 (Ref)                               |
| National Wealth Quantile (3)       | 0.98 (0.82, 1.18)        | 0.86 (0.74, 1.00)                     | 1.22 (0.96, 1.55)                        |
| National Wealth Quantile (4)       | 1.09 (0.91, 1.30)        | 0.78 (0.66, 0.92)**                   | 1.55 (1.22, 1.96)***                     |
| National Wealth Quantile (5)       | 1.34 (1.07, 1.67)*       | 0.77 (0.62, 0.95)*                    | 2.10 (1.55, 2.83)***                     |
| SP clinic visit (No)               | 1.00 (Ref)               | 1.00 (Ref)                            | 1.00 (Ref)                               |
| SP clinic visit (Yes)              | 0.80 (0.70, 0.91)**      | 0.93 (0.83, 1.05)                     | 0.66 (0.51, 0.72)***                     |
| Survey round (baseline)            | –                       | 1.00 (Ref)                            | –                                        |
| Survey round (1)                   | –                       | 0.76 (0.68, 0.85)***                  | –                                        |
| Survey round (2)                   | –                       | 0.80 (0.72, 0.90)***                  | –                                        |
| Survey round (3)                   | –                       | 0.82 (0.73, 0.92)**                   | –                                        |

\* = P<0.05,  
\** = P<0.01,  
\*** = P<0.001.  
LME = Linear mixed-effect regression.
In the adjusted model for direct expenditure for general care-seeking, significant results were observed between townships, with total household members, and across survey rounds. Households in Shwepyithar township spent up to 1.42 times higher (95% CI 1.22, 1.66; $P < 0.001$) than those in Hlegu for direct expenditure on general care-seeking. Contrary to OOPCTP, increase in one household member resulted 3% increase in direct expenditure for general care-seeking (1.03 times, 95% CI 1.00, 1.06; $P < 0.05$). The direct expenditure for general care-seeking among the households that used SP clinics was up to 50% lower compared with those which did not (0.50 times, 95% CI 0.44, 0.57; $P < 0.001$). Compared with the baseline, direct expenditure for general care-seeking was significantly lower in all three follow-up rounds (0.71, 0.64 and 0.58 times, $P < 0.001$).

In the adjusted model for direct expenditure on family planning, only household location and SP clinic visits had a significant effect. Households in Shwepyithar had 1.36 times higher direct expenditure for general care-seeking (1.03 times, 95% CI 1.00, 1.06; $P < 0.05$). The direct expenditure for general care-seeking among the households that used SP clinics was up to 50% lower compared with those which did not (0.50 times, 95% CI 0.44, 0.57; $P < 0.001$). Compared with the baseline, direct expenditure for general care-seeking was significantly lower in all three follow-up rounds (0.71, 0.64 and 0.58 times, $P < 0.001$).

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The linear mixed-effect regression model showed that household out-of-pocket health expenditure proportion as the share of household capacity to pay (OOPCTP) significantly decreased during and after the implementation of the new health financing scheme, and it was 1.8 times higher in the area with lower utilization of the SP scheme clinic (SP clinic), compared with the other one. Our findings underscored the fact that the optimal utilization of services was critical for the successful implementation of new health financing schemes. We found evidence that the new health financing scheme resulted in an overall higher decrease in OOPCTP in the areas with a high utilization of SP clinic, even after accounting for the mandatory co-payment for each visit.

As the decrease in OOPCTP was an observed change over time and there was no control group for counterfactual scenarios, there could be alternative explanations for the decrease in OOPCTP such as a marked increase in household CTP or decrease in health-seeking. Although there were some increases in household CTP and other expenditures over 3 years of observation, such increases could be partially attributed to inflation as the consumer price index for Myanmar changed by +15% from 2017 to 2019 (Knoema, 2021). In addition, health expenditures decreased over time, in contrast to other expenditures. This decrease in health expenditure was not brought about by decreases in health-seeking, as all households in the study sought some health care in all study rounds.

In addition, OOPCTP was lower among the more affluent households compared with the poorer ones, households where the head held a skilled occupation compared with those with unemployed ones and households with higher number of total household members. This suggested a concrete relationship between income earning capacity of the household and OOPCTP. Even after careful pro-poor beneficiary selection for the project and implementation of new health financing scheme to replace fee-for-service payments, less affluent households still had to spend a higher fraction of their capacity to pay for seeking health care.

The intricacies of health care expenditure became more evident in the separate regression models. Direct expenditure on care-seeking was significantly lower across all follow-up survey rounds, compared with the baseline. However, there was
no evidence of such decrease in direct expenditure for family planning. This might stem from the fact that women may not seek family-planning services from clinics but buy the contraceptives directly from the nearby drug shops instead, as the drug shops and pharmacies accounted for 54% of contraceptive market share in Myanmar (FPWatch Group, 2016). Nevertheless, we found that the direct expenditures on both care-seeking and family planning among those who used services from SP clinics were as much as 30–50% lower than those who sought care from other sources.

Contrary to the findings on OOPCTP, there was no evidence of difference in direct expenditures for care-seeking and family planning between the affluent and less affluent households. This finding pointed out that the households in our study had to spend a comparable amount of money for health-seeking, regardless of their income levels. Still, utilization of SP clinics had highly plausible effect on household direct health expenditures as evident by the difference between two geographic areas, where households in Shwepyithar township had to spend 1.4 times higher than those in Hlegu.

Direct expenditure for care-seeking increased slightly with the increase in the number of household members but that for family planning did not. This finding suggested that the need for care-seeking was proportional to the number of family members, but the need for family planning was similar regardless of the number of family members.

Since the new financing scheme was designed to replace existing fee-for-service payments for private-sector health care among the beneficiaries, the finding of low (non-optimal) utilization rates in Shwepyithar township was an unexpected one. In the beginning of the project, the capitation model was designed to accommodate expected number of visits from the beneficiaries and a small co-payment was even added to deter moral hazard (overuse). However, the households in Shwepyithar did not reach these optimal utilization levels of the SP clinics during the project.

The fact that the households in Shwepyithar had 1.8 times higher OOPCTP compared with those in Hlegu may be partially attributable to innate differences in the two locations, in addition to the utilization rates of the SP clinics. For this reason, we had carefully considered the possible influencing factors for OOPCTP such as household characteristics, wealth quintiles, expenditures and clinic visits. There were differences in household characteristics and wealth quintiles between two locations, as the selected area in Shwepyithar township was peri-urban slum area and the other in Hlegu township more rural. However, there was no evidence of significant differences between the two locations in terms of household capacity to pay, poverty levels and CHE.

In addition, we had taken meticulous approach in the analysis to take advantage of the longitudinal design of the study. The regression model considered the unique code numbers of each household as the random effect to account for correlations between the repeated assessments. In this way, we could model how the household health expenditures and OOPCTP changed over time in a more powerful manner. Also, appropriate non-parametric tests were conducted for comparisons of various expenditure values across locations and rounds, as almost all these values did not follow a normal distribution.

There were a few limitations in our study. First, we excluded hospitalizations and in-patient care episodes from expenditure calculations as the purpose of the study was to look at the effect of the new health financing scheme at the primary care level. Therefore, the estimates of OOPCTP and CHE could be lower in our study compared with those which included such expenses (Khaing et al., 2015; Myint et al., 2019). Second, we could not explore the underlying reasons for differences in utilization rates for SP clinics between two townships, as these were beyond the scope of the study. Third, the eligibility criteria for the baseline survey excluded those without any reported illness or health-seeking, and this might lead to an apparent decrease in health expenditures if the households no longer sought care in the follow-up rounds. To prevent any bias from this design, we used the same eligibility criteria for all rounds and the dataset was filtered to households eligible for all four rounds. Finally, we did not adjust for inflation across the assessments, and therefore, the apparent increase in household expenditures with time may be due to inflation. However, the main outcome variable, OOPCTP, was not affected by this limitation as it was an expenditure ratio.

With all the limitations considered, our study found solid evidence for the decrease in OOPCTP during and after the implementation of the new health financing scheme in the study areas. Even after other plausible causes were being analysed meticulously, there was evidence that those with a higher utilization of SP clinics enjoyed lower OOPCTP and lower direct health expenditures. Such evidence was backed by carefully gathered rich data over the years, compounded by thorough and robust analysis methods. The authors believe that the findings from the study will be useful for the implementors of new health financing schemes and the researchers who were tasked with the evaluation of such schemes around the world.

**Conclusion**

Household OOPCTP decreased significantly during and after the implementation of the new health financing scheme through SP clinics in the study areas. Households in areas with higher utilization of SP clinics had much larger decreases in OOPCTP compared with those in the other areas. Household direct expenditures on care-seeking and family planning were as much as 50% lower among those who used SP clinics, compared with those who sought other sources. Our study highlighted that capitation-based health financing schemes could successfully lower OOP among the poor and optimal utilization of services was paramount in the successful implementation of such schemes. Therefore, for an effective scale-up of new health financing schemes, service utilization rates should be carefully monitored as one of the critical indicators.

**Data Availability statement**

The data underlying this article will be shared on reasonable request to the corresponding author.

**Funding**

This project was supported by Access to Health Fund. This paper was published as part of a supplement financially supported by the International Development Research Centre.
Acknowledgements

We would like to acknowledge participants of the household survey for sharing their experience, Research field team of PSI/Myanmar for their contribution in data collection of the survey and Program Management Division for the support in conducting the study. Special thanks go to Dr Han Win Htat, Head of Program Management Division, for his tremendous contribution to design and implementation of the study.

Authors’ contribution

The study was designed by STThein, MMThet and YKAung. Data analysis was conducted by STThein and YKAung. STThein is the lead author of the manuscript. MMThet contributed writing of the manuscript. All co-authors reviewed and provide comments for finalizing the manuscript.

Ethical approval

The study was approved by PSI Research Ethics Board (REB), Washington DC (Approval Ref# 42.2018) and by Ethics Review Committee, Department of Medical Research, Ministry of Health and Sports, Myanmar (Approval Ref# Ethics/DMR/2017/039A/2017). All ethical considerations such as respect for autonomy and privacy, non-maleficence and justice were in place throughout the design and implementation of the study. All participants gave written informed consent for the study.

Conflict of interest statement

The authors declare that they have no conflicts of interest.

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