

# The Interaction Relationship Between The Diversification of Health Care Support Activities and The Health Care Services Outreach: Evidence from Microfinance Institutions in Vietnam

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## Research

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# Abstract

**Background:** One of the main ways to strengthen the health-system capacity by the intersectoral approaches is to promote social health by linking microfinance with healthcare support activities. The aim of the study was to discover the interaction relationship between the diversification of health care support activities and the health care services outreach of formal microfinance institutions (MFIs) in Vietnam. This study proposes policy measures that could be implemented by the policy makers, managers of MFIs to diversify the health care support activities and to promote the health care services outreach.

**Methods:** This study used the panel data regression method from 2010 to 2019 of all formal MFIs in Vietnam, the study found out the interaction relationship between the diversification of health care support activities and the health care services outreach of formal MFIs in Vietnam.

**Results:** The results showed that number of branches and the health care services outreach had positive relationships with the diversification of health care support activities; productivity had a negative impact on the diversification of health care support activities. The diversification of health care support activities, and productivity had positive relationships with the health care services outreach; number of branches had a negative impact on the health care services outreach. At the same time, this study found bidirectional interactions and the causal relationship between the diversification of health care support activities and the health care services outreach of formal MFIs in Vietnam.

**Conclusions:** This study found bidirectional interactions and the causal relationship between the diversification of health care support activities and the health care services outreach. The study results encourage and provide opportunities to diversify the health care support activities and to promote the health care services outreach of formal MFIs in Vietnam.

## Background

One of the main ways to strengthen the health-system capacity by the intersectoral approaches is to promote social health by linking microfinance with healthcare support activities. Up to now, many countries have focused to strengthen the resources for the health system development. At the same time, they have focused on reducing the poverty gap as well as improving health. Therefore, many countries have increased to build their health-system capacity by the intersectoral approaches. One of the main ways that they have promoted social health is by the linking of microfinance with the healthcare support activities. MFIs expand their services to include the health care services. Because, the health care services are the extension of their mission of financial security and social protection of the customers, and healthier customers better serve the MFIs' goals of growth, and long-term viability. Therefore, the health care services outreach is one of the main ways that they have promoted their operational sustainability. Many MFIs have shown their ability to contribute to improving health care capacity by educating clients, facilitating access to the health care services, providing health financing options and even directly

delivering clinical care. MFIs provide the health care services to many households in support of access to the health care services. Many of them live in rural and remote areas beyond the reach of the hospitals and health agencies. Many MFIs already successfully offer the health care services. Increasing numbers also provide health-related services, such as medical care, health financing, and establishing links with medical service providers to facilitate access to health care. However, MFIs offer the health care services, admittedly with challenges to employ the infrastructure for delivery of health-related services to those most in need. The poor people bear a hugely disproportionate share of disease and ill-health, and inability to access the health system emerged as key factors inducing and resulting from poverty [1].

In Vietnam, the operations of formal MFIs have reached 25 provinces and cities with 176 branches and transaction offices in Vietnam. One of the significant missions of formal MFIs are the formulation of the policies that are intended to diversify the health care support activities and to promote the health care services outreach to the microfinance customers. However, to diversify the health care support activities and to promote the health care services outreach are quite the toughs, and challenges for MFIs. The challenges have to face as servicing remote and sparsely populated areas, fast-paced growth needs proper infrastructural planning such as branches, transaction points, which can be dangerously inefficiency without a high degree of diversification in health care support activities, and the health care services success is limited, etc. The studies of MFIs delivering the health care support activities showed increasing evidence of positive impact. Many studies found that adding health care instruction, health education, usually delivered during the microfinance customers group meetings, improves knowledge, and creates confidence that leads to behavioural change. These behaviours are associated with positive health outcomes in diverse areas that are critically important to achieving the health care services outreach [1]. Addressing this gap, the study's purpose was to examine the interaction relationship between the diversification of health care support activities and the health care services outreach. The research approach is based on the diversification of health care support activities of formal where microfinance is seen as the health care services outreach. The study used a quantitative approach using panel data from the formal MFIs from 2010 to 2019. This study has developed an in-depth analysis of the health care services outreach and an econometric analysis on the interaction relationship between the diversification of health care support activities and the health care services outreach. The research demonstrated that bidirectional interactions and the causal relationship between the diversification of health care support activities and the health care services outreach. The study results will contribute to the theoretical and experimental. Furthermore, the study offers policy implication and new insights for developing a more the health care services outreach of formal MFIs and further emphasizes optimal policies to formal MFIs management; the managers should make conscious efforts and create a balance in the achievement of the goals of health care services outreach in accomplishing the diversification of health care support activities. Therefore, this study is urgently required to balance the goals of health care services outreach. In particular, this study is helpful to decision-makers and other stakeholders of formal MFIs in Vietnam.

## Theory

## The diversification of health care support activities

The diversification of health care support activities were defined as microfinance outreach indicator, it was measured by diversity indicators in microfinance services indicators, and it had been defined by various researchers differently. The microfinance services diversity was the number of types of microfinance services offered by MFIs [2]. The microfinance services diversity was the number of types of microfinance services contracts supplied. The microfinance services diversity might mean both financial services and non-financial services. The MFIs had ample non-financial services not only because it offered the health care support activities with a variety of terms but also because it offered establishing linkages to health providers to facilitate access to health care, and even directly delivering clinical care [3]. The microfinance services diversity referred to the diversity of services and products beings availed by active customers. This included variety of non-financial services [4]. The microfinance services diversity indicated the number of the types of products and services, and others offered product based on the product lines or the types of product including the number and type of offered product, difference in the number, and the type of the offered voluntary non-finance service [5]. The MFIs promoted the diversification of products and services in line with the operation trends and associated with the development of modern technology to meet the customer needs, that contribute to expand the scope of outreach of MFIs [6]. The number of microfinance products and services showed the number of product and service groups, the number of products and services in each microfinance product and service group. The number of microfinance products and services was manifold, the microfinance product and service diversification contributed to expand the scope of outreach to the microfinance customers. At the same time, the microfinance services diversity might mean both financial services and non-financial services. The microfinance services diversity within a non-financial services might mean educating clients, facilitating access to the health care services, providing health financing options, establishing linkages to health providers to facilitate access to health care, and even directly delivering clinical care [7].

The previous literature showed that the diversification of health care support activities can be measured in different ways. In this study, the diversification of health care support activities refers to the number of health care support activities offered to the microfinance customers. Accordingly, the diversification of health care support activities reflects the number, and type of health education, providing health programs, health promotion programs, adoption of nutrition practices, discussed family planning with spouses, health nutrition knowledge and practice among women, more attention to infant care- nutrition, vaccination, etc., facilitating access to the health care services, providing health financing options, establishing linkages to health providers to facilitate access to health care, and directly delivering clinical care, and different health care support services offered by MFIs.

The diversification of health care support activities is associated with all MFIs' operations, it has been regarded as a prerequisite for continuous improvement the health care services outreach and is influenced by many factors, including:

*Firstly*, asset growth rate: There was a positive relationship between microfinance services and assets. Thereby, the asset growth rate had a positive relationship with the diversification of health care support activities [2]. The asset growth of MFIs would contribute positively to the development of microfinance products and services, which included diversification of the health care support activities [8].

*Secondly*, number of branches: A large branch network ensured customers could access more and more convenient the microfinance services, allowing MFIs to provide the diverse microfinance services, including the health care support activities [9]. Thereby, number of branches contributed to diversify the health care support activities of MFIs. Many MFIs provided microfinance services to millions households worldwide. In particular, they provided the health care support activities a million of these households are very poor, many households are lived in remote areas beyond the reach of health agencies. Microfinance sector increased number of MFIs to offer health-related services, such as instruction, clinical care, health-financing and linkages to the health providers. This contributed to diversify the health care support activities of MFIs [10]. Some MFIs had increased the number of branches, expanding the scope of the operations that had provided the variety of microfinance services and promoted diversification of the health care support activities [11].

*Thirdly*, productivity: The productivity was one of the indicators in microfinance that measured as a ratio of the number of customers to number of staff. This indicator showed how efficiently the available human resource was utilized [12]. Productivity was measured the numbers of customer per staff of MFIs [13]. The staff productivity positively drove the outreach of MFIs. The results showed that the productivity appeared to be a better predictor of MFIs wider outreach. This provided an incentive for MFIs to provide a wide range of products services, including health care support activities [14]. Hence, the productivity had a positive relationship with diversification of the health care support activities of MFIs. Microfinance initiatives have been shown to advance health outcomes. The MFIs always maintain a combination of the productivity and the health care services outreach, and an appropriate productivity growth strategy contributed to diversify the health care support activities of MFIs [15].

*Fourthly*, the health care services outreach: Services outreach was the term that was used to reflect the health services that mobilized health resources to provide health services to the population in in remote and rural areas [16]. Therefore, the health care services outreach aimed towards promoting health care services by enhancing health care delivery in communities. Through the health care service providers, communities can improve innovative approaches to challenges related to their specific health needs. Services outreach was the term that was used to reflect the health services that mobilized health resources to provide health services to the population in remote and rural areas [16]. Therefore, the health care services outreach aimed towards promoting health care services by enhancing health care delivery in communities. Through the health care service providers, communities can improve innovative approaches for the challenges related to their specific health needs. There are many the research on the outreach of MFIs, the outreach of MFIs was measured by the number of people a microfinance institution has extended their services over a specific period [17]. The outreach of MFIs was related to the actual number of microfinance customers [18]. The outreach of MFIs was related to the actual number of poor

people reached with services of MFIs [14]. The outreach of MFIs concerned with the efforts to widen service for those who receive inadequate service. The indicators refer to the number of customers, the shifting percentage of served clients and either the types of products or programs [5]. The outreach of MFIs the larger the number of customers the better the outreach of MFIs. Therefore, the health care services outreach could be measured by many ways. This study used the number of customers to measure the health care services outreach [15]. The increase in outreach was undoubtedly to some extent the result of an increase in the services of MFIs. The outreach included the health care services outreach that referred to the goal of extending as many services as possible of MFIs [19]. Many MFIs have increased the outreach to meet the services needs of customers and members, The outreach of MFIs contributed to expand their operations and diversify the health care support activities of MFIs [20].

*Fifthly*, operational sustainability: Sustainability in the operations was the goal of many sectors and fields, each sector would rely on economic and social characteristics to plan the most suitable strategy for sustainable development. The MFIs would have operational sustainability if their revenue generated from the operations that covered the operating expenses, financing costs and loss provisions. The ability of the organizations to meet their operating cost was defined the sustainability [21]. Sustainability generally meant the ability of an ongoing program to perform activities and services in pursuit of the planned objectives. Operational sustainability of MFIs referred to the ability of MFIs to cover all of its costs through their income, and this was a tangible parameter that was measured continuously to monitor the level of income to cover all costs to ensure that MFIs would develop in long-term [15]. MFIs provided the poor with social services such as the health care service activities and health care instruction. They have increased social sustainability, which provided additional services to particular clientele in remote and rural areas. As a result, the operational sustainability of MFIs contribute to diversify the health care service activities to meet the growing demand of their members and customers [22]. The delivering high-quality care and improved public health were the results of the sustainable health, and care systems. It was easy to imagine a sustainable health and care system, the sustainability of everything that impacted on the health care services such as health promotion, health care instruction, and developing more diversification and sustainable models of health care [23]. This showed operation sustainability had a positive relationship with the diversification of health care support activities.

### **The Health Care Services Outreach**

The health care services outreach was one of the possibilities to increase access to health services, and better mobilization of health resources to provide health services to the population in remote or underserved areas. The health care services outreach was measured by the number of customers of MFIs [16]. The health care services outreach is associated with all MFIs' operations, it has been regarded as a prerequisite for continuous increasing the diversification of health care support activities and is influenced by many factors, including:

*Firstly*, number of branches: The distribution, making sure that the products and services was available where and when it was wanted. This included such options such as outreach agents, branches. From the customer's perspective, place referred to convenience and accessibility of the product or service being

offered by MFIs. Therefore, the number of branches was one of the factors that positively affected the outreach of MFIs [24]. The number of branches was one of the delivery channels for microfinance products and services. Expanding this delivery channels generated convenience and increased accessibility of the product or service being offered by MFIs. At the same time, MFIs were often to improve delivery channels to increase the outreach, and thanks to its distribution network such as the branches and transaction points, many MFIs promoted the health care services outreach [20]

*Secondly, productivity:* The breadth of outreach was the size or scale of microfinance institutions. The focus on outreach to the customers involved increasing the customers base in MFIs. The staff productivity was significantly positive correlated with microfinance services outreach measure of microfinance institutions. This showed that the productivity had a positive relationship with the health care services outreach of MFIs [25]. The staff productivity positively drove the breadth of outreach of MFIs. The results showed that using the number of customers appeared to be a better predictor of MFIs wider outreach [14]. Thereby, the productivity had a positive relationship with the health care services outreach of MFIs. The increasing in the productivity resulted into more the number of microfinance customers. The fact that MFIs had higher the productivity that obtained better the breadth and there was the interactive relationship between the MFIs' productivity and breadth of outreach in a positive trend. This showed the MFIs always maintain a combination of the productivity and the health care services outreach, and an appropriate productivity growth strategy contributed to improve the health care services outreach of MFIs [15].

*Thirdly, equity growth rate:* Equity growth rate contribute to improve the financial capacity of MFIs, and financial capacity understood as long-term effects had impact on the microfinance services. Thereby, an improved financial situation was one of the vital factors that contributed to achieving better service diversification, including the health care support services [26]. Many MFIs had a low equity and faced many difficulties in attracting the members and customer. Therefore, the less equity growth rate compared to other financial sources, the fewer improvements in the health care services outreach of MFIs [15].

*Fourthly, the diversification of health care support activities:* The MFIs diversified to offer the services, i.e, product diversification. The results showed that product diversification by MFIs had a positive impact on the outreach. Thereby, this showed the diversification of health care support activities contribute to advance the health care services outreach of MFIs [27]. Many MFIs diversified to offer the services, i.e, product diversification such as type of different non-financial services offered by formal MFIs. The formal MFIs promoted the diversification of products and services in line with the operation trends and associated with the development strategies, that contribute to increase the outreach of MFIs. In other words, the diversification of health care support activities had a positive impact on the health care services outreach of MFIs [20].

*Fifthly, operational sustainability:* There was a positive association exists between outreach breadth and sustainability of MFIs. This showed the operational sustainability contributed to expand the services

outreach of MFIs [28]. The operational sustainability had a positive relationship with the outreach breadth of MFIs. Many MFIs increased in operational sustainability and lead to advance the health care services outreach of MFIs [15].

## Methods

Primary data and secondary data are both used in this study. Secondary sources of data are collected from international journals, books, etc. Primary data are collected from the website of MIX Market, annual reports, financial reports of all formal MFIs in Vietnam from 2010 to 2019. This research has analysed and synthesized the theoretical basis relating to the diversification of health care support activities and the health care services outreach of MFIs. Based on the synthesized and analysed theories, the paper defined the factors affecting the diversification of health care support activities and the health care services outreach, the analysis model of the interaction relationship between the diversification of health care support activities and the health care services outreach of all formal MFIs in Vietnam is established as follows:

$$Y_1 = \alpha_{10} + \alpha_{11}Y_2 + \sum_{k=1}^n \beta_{1k}X_{1k} + \mu_1 \quad (1)$$

$$Y_2 = \alpha_{20} + \alpha_{21}Y_1 + \sum_{\gamma=1}^m \beta_{2\gamma}X_{2\gamma} + \mu_2 \quad (2)$$

Where,

$Y_1$  is the variable that measures the diversification of health care support activities, determined by the number of health care support product and service types.

$Y_2$  is the variable that measures the health care services outreach, determined by the number of active customers.  $X_{1k}$ ,  $X_{2\gamma}$  are the independent variables that can affect the diversification of health care support activities and the health care services outreach in equations (1) and (2), respectively.

The coefficient  $\alpha$  and coefficient  $\beta$  are the correlation coefficients of the independent variables with the dependent variables, which are the error terms of the model. For simplicity, indicator  $i$  represents the number of observations and indicator  $t$  represents the number observed year. This study uses Stata 15.0 software, the definitions of variables and expected signs are presented as can be seen in Table 1.

Table 1  
Summary of the research model variables

Variables and symbols	Definition	Expected sign and hypotheses
<b>Factors affecting the diversification of health care support activities</b>		
Dependent variable		
The diversification of health care support activities (NHT)	The number of health care support product and service types	
Independent variable		
The asset growth rate (AGR)	Growth in asset	H1.1: + (high AGR, high NHT)
Number of branches (BRA)	The number of branches	H1.2: + (high BRA, high NHT)
Productivity: Numbers of customers on numbers of staff ratio (CSR)	Numbers of customers / Number of staff	H1.3: + (high CSR, high NHT)
The health care services outreach (NAC)	The number of active customers	H1.4: + (high NAC, high NHT)
Operational sustainability (OSS)	Operating income / (Operating expenses + financing costs + provision for loan losses)	H1.5: + (high OSS high NHT)
<b>Factors affecting the health care services outreach</b>		
Dependent variable		
The health care services outreach (NAC)	The number of active customers	
Independent variable		
Number of branches (BRA)	The number of branches	H2.1: + (high BRA, high NAC)
Productivity: Numbers of customers on numbers of staff ratio (CSR)	Numbers of customers / Numbers of staff	H2.2: + (high CSR, high NAC)
The equity growth rate (EGR)	Growth in equity	H2.4: + (high EGR, high NAC)

<b>Variables and symbols</b>	<b>Definition</b>	<b>Expected sign and hypotheses</b>
The diversification of health care support activities (NHT)	The number of health care support product and service types	H2.3: + (high NHT, high NAC)
Operational sustainability (OSS)	Operating income / (Operating expenses + financing costs + provision for loan losses)	H2.5: + (high OSS high NAC)

*Source:* Own study.

This study used regression analysis on a set of panel data, evaluated the fluctuations of variables and performed the correlation analysis. The fixed effects model (FEM) and the random effects model (REM) are the applied models for panel data analysis in this study. The variance inflation factor (VIF) test was carried out on each independent variable of this study model. The research conducted the Hausman test for the model specification for the FEM and REM, and tested for the statistical significance of difference between the coefficients estimates obtained by FEM and by REM, The study chose the result between FEM and REM, and compared them with the pooled ordinary least square model (OLS) to determine the influencing factors for this model and found the impact of the factors on the diversification of health care support activities, and the health care services outreach. At the same time, the study also conducted testing for a variance change to consider the variance change phenomenon, and checked the autocorrelation to examine serial correlation in this model.

## **Results**

### **Descriptive statistics**

This study performed descriptive statistics of both the dependent and the independent variables, which are presented in Table 2. The results found that the AGR, BRA, CSR, NHT, OSS variables had smaller standard deviations than the average, this indicated that values tend to be close to the mean of the variables. The asset growth rate reduced in some MFIs, due to restructure their operations. The number of branches increased in many MFIs, and 72 branches was the highest. The productivity of MFIs improved over the years, and it achieved over 663 customers per staff. Many MFIs expanded their operations, and the number of health care support product and service types had the highest level of 19 products and services. The operational sustainability always was maintained and improved in many MFIs. The EGR, NAC variables have fluctuations. This indicated that values are spread out over a wider range, due to the large difference in the equity growth rate, and the health care services outreach between the MFIs. Many MFIs increased the health care services outreach and the equity growth rate every year to meet the needs

of members and customers, but some of them reduced the equity growth rate due to restructure their operations.

Table 2  
Descriptive statistics

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
AGR	23.35575	17.53726	-6.3	69.58
BRA	25.925	22.18383	4	72
CSR	262.3245	175.8024	6.36	663.9
EGR	16.7215	17.43909	-21.1	68.67
NAC	96003.65	108988.8	414	339468
NHT	7.9	5.217328	2	19
OSS	130.5	21.18052	100	178.4

*Source:* Compiled from data processing results of Stata software

### **Correlation Analysis**

This study tested the multicollinearity, and the multicollinearity occurred when two or more independent variables are highly correlated in the regression model. The analysis results of correlation between variables in the model indicated a very low degree of correlation among the variables, so the presence of any multicollinearity was neglected Table 3.

Table 3  
Correlation matrix

	NHT	AGR	BRA	CSR	NAC	OSS
<b>Correlation matrix for factors affecting NHT</b>						
NHT	1.0000					
AGR	-0.1867	1.0000				
BRA	0.5366	-0.0904	1.0000			
CSR	0.5094	0.0649	0.3007	1.0000		
NAC	0.6437	-0.0364	0.4279	0.6574	1.0000	
OSS	0.2675	0.1887	0.2508	0.5718	0.4880	1.0000
<b>Correlation matrix for factors affecting NAC</b>						
	NAC	BRA	CSR	EGR	NHT	OSS
NAC	1.0000					
BRA	0.4279	1.0000				
CSR	0.6574	0.3007	1.0000			
EGR	0.0668	-0.0048	0.0811	1.0000		
NHT	0.6437	0.5366	0.5094	-0.0056	1.0000	
OSS	0.4880	0.2508	0.5718	0.0645	0.2675	1.0000
<i>Source:</i> Compiled from data processing results of Stata software						

## Regression Results

Regression was carried out using FEM and REM, and compared with OLS between the NHT dependent variable and AGR, BRA, CSR, NAC, OSS independent variables. According to the results of FEM and REM, both P-values were less than the significance level of 5% (P-value = 0.000), so the regression models were statistically significant at the significance level of 5%. In FEM, the variables BRA and NAC had positive impacts on the variable NHT at the significance level of 1% and 1%, respectively; the variables AGR and OSS had positive impact on the variable NHT, the variable CSR had a negative impact on the variable NHT, these variables were not statistically significant. In REM, the variables BRA and NAC had positive impacts on the variable NHT at the significance level of 1% and 1%, respectively; the variables CSR and OSS had negative impact on the variable NHT at the significance level of 10% and 10%, respectively; the variable AGR had a negative impact on the variable NHT, but this last variable was not statistically significant in the model as can be seen in Table 4.

The Hausman test was performed to select the appropriate model and the Hausman test result obtained a Pvalue of 0.0692, greater than the significance level of 5%, so the REM was more suitable than FEM. In comparison to the OLS Pooled model, REM was more suitable than the OLS Pooled model. Therefore, the study used the REM regression results to analyze and test the next steps. The multicollinearity test of the model had a result of Mean VIF = 3.25, VIF of variables from 1.10 to 6.25. This result showed no serious multicollinearity in this model. In the test for variance the change of the model, the P-value = 0.9121 and was greater than 0.05, therefore, this model did not have the variance change phenomenon. When checking the autocorrelation of the model, P-value = 0.0232 was smaller than 0.05 so this model did have serial correlation. This study performed to overcome the and serial correlation. The results in REM (xtgls) showed that the variables BRA and NAC had positive impacts on the variable NHT at the significance level of 1% and 1%, respectively; the variables CSR and OSS had negative impact on the variable NHT at the significance level of 5% and 10%, respectively; the variable AGR had a negative impact on the variable NHT, but this last variable was not statistically significant in the model as can be seen in Table 4.

Table 4  
Regression results for factors affecting NHT

Independent variables	Dependent variable (NHT)		
	FEM	REM	REM (xtgls)
AGR	0.00613 (0.43)	-0.0167 (-1.19)	-0.0100 (-0.91)
BRA	0.0979*** (8.45)	0.0960*** (7.31)	0.0949*** (8.69)
CSR	-0.00998 (-1.81)	-0.0119* (-2.02)	-0.0138** (-3.07)
NAC	0.0000446*** (4.84)	0.0000537*** (5.67)	0.0000549*** (7.27)
OSS	0.00467 (0.26)	-0.0348* (-2.44)	-0.0242* (-1.97)
_cons	2.945 (1.35)	8.326*** (5.38)	7.146*** (4.88)
P-value	0.0000	0.0000	0.0000
<i>Notes: ***, **, * denote significance at the level of 1%, 5% and 10%</i>			

Source Compiled from data processing results of Stata software

Regression was carried out using FEM and REM, and compared with OLS between the NAC dependent variable and BRA, CSR, EGR, NHT, OSS independent variables. According to the results of FEM and REM, both P-values were less than the significance level of 5% (P-value = 0.000), so the regression models were statistically significant at the significance level of 5%. In FEM, the variables CSR and NHT had positive impacts on the variable NHT at the significance level of 1% and 1%, respectively; the variable BRA had a negative impact on the variable NHT at the significance level of 10%; the variables EGR and OSS had positive impact on the variable NHT, but these variables were not statistically significant. In REM, the variables CSR and NHT had positive impacts on the variable NHT at the significance level of 1% and 1%, respectively; the variable BRA had a negative impact on the variable NHT at the significance level of 10%; the variables EGR and OSS had positive impact on the variable NHT, but these variables were not statistically significant as can be seen in Table 5.

The Hausman test was performed to select the appropriate model and the Hausman test result obtained a Pvalue of 0.9175, greater than the significance level of 5%, so the REM was more suitable than FEM. In comparison to the OLS Pooled model, REM was more suitable than the OLS Pooled model. Therefore, the study used the REM regression results to analyze and test the next steps. The multicollinearity test of the model had a result of Mean VIF = 3.22, VIF of variables from 1.01 to 6.27. This result showed no serious multicollinearity in this model. In the test for variance the change of the model, the P-value = 1.0000 and was greater than 0.05, therefore, this model did not have the variance change phenomenon. When checking the autocorrelation of the model, P-value = 0.0322 was smaller than 0.05 so this model did have serial correlation. This study performed to overcome the and serial correlation. The results in REM (xtgls) showed that

the variables CSR, NHT and OSS had positive impacts on the variable NHT at the significance level of 1%, 1% and 10%, respectively; the variable BRA had a negative impact on the variable NHT at the significance level of 10%; the variables EGR had a positive impact on the variable NHT, but this last variable was not statistically significant in the model as can be seen in Table 5.

Table 5  
Regression results for factors affecting NAC

Independent variables	Dependent variable (NAC)		
	FEM	REM	REM (xtgls)
BRA	-696.6* (-2.11)	-511.7* (-2.01)	-525.3* (-2.25)
CSR	397.1*** (9.05)	410.2*** (10.96)	406.0*** (12.15)
EGR	40.06 (0.20)	88.79 (0.51)	81.30 (0.52)
NHT	10831.2*** (4.76)	9338.2*** (6.19)	9508.1*** (6.91)
OSS	2.529 (0.01)	78.45 (0.39)	94.22* (0.51)
_cons	-76670.2* (-2.32)	-83838.7*** (-3.58)	-85586.9*** (-3.97)
P-value	0.0000	0.0000	0.0000
<i>Notes: ***, **, * denote significance at the level of 1%, 5% and 10%</i>			

Source Compiled from data processing results of Stata software

## Discussion

The results of REM (xtgls) in Table 4 indicated that variable BRA had a coefficient 0.0949 with the significance level of 1%. This result showed that for one unit increased in the number of branches, the diversification of health care support activities was anticipated to improve by 0.0949 units, when the remaining variables in the model were kept constant. As expected, this result was broadly in harmony with the expected sign and hypotheses, this meant that MFIs focused to expand the number of branches goal was likely to increase the the diversification of health care support activities. This meant that MFIs focused to expand the number of branches that were likely to increase the diversification of health care support activities. This helped to diversify the health care support activities for the members and customers, the expansion of more and more the branches and transaction points of MFIs contributed to increase in many the health care products and services, thereby better meeting the health care needs of the members and customers.

The outcome of the regression analysis indicated the variable CSR had a coefficient  $-0.0138$  with the significance level of 5%. This result showed that for one unit increased in the productivity, the diversification of health care support activities was anticipated to decrease by 0.0138 units, when the remaining variables in the model were kept constant. Some MFIs had a high productivity over the years. A high productivity meant that MFIs focused on the numbers of customers on numbers of staff ratio to provide some common health care products and services. Therefore, they lacked the opportunities to expand the operations for the diversification of health care support activities to meet the needs of diverse customers populations, that included prevention, diagnostics, treatment instruction, nursing care and midwifery, improving the experience of care, improving the health of populations, etc.

The model result exhibited a very significant effect of NAC on the diversification of health care support activities, and the coefficient was positive and statistically significant at the 1% level. This result showed that for one unit increase in the health care services outreach, the diversification of health care support activities was anticipated to increase by 0.0000549 units, when the remaining variables in the model were kept constant. As expected, this result was broadly in harmony with the expected sign and hypotheses, and there was a complement relationship exists between the health care services outreach and the diversification of health care support activities. The increase in the health care services outreach contributed to promote the diversification of health care support activities. Beside some common health care products and services, many MFIs met the needs of customers in the health care support activities to achieve the goal of extending as many products and services as possible of MFIs. Thus, the formal MFIs achieved dual goals including the health care services outreach and the diversification of health care support activities over the years.

The regression result indicated a significant effect of the operational sustainability on the diversification of health care support activities with the coefficient was negative and statistically significant at the 10% level. This result showed that for one unit increased in the operational sustainability, the diversification of health care support activities was anticipated to decrease by 0.0138 units, when the remaining variables in the model were kept constant. As unexpected, this result was not broadly in harmony with the expected sign and hypotheses, and there was a trade-off between the operational sustainability and the diversification of health care support activities. The operational sustainability was not one of the suitable conditions to promote the diversification of products and services. Many MFIs have not taken the advantage of operational sustainability to expand operations, providing a wide range of products and services to customers. Beside they met the needs of some common health care products and services, many MFIs did not meet the needs of customers in the health care support activities to achieve the goal of extending as many products and services as possible of MFIs.

The results of REM (xtgls) in Table 5 showed that variable BRA had a coefficient  $-525.3$  with the significance level of 10%. This result found that for one unit increased in the number of branches, the health care services outreach was anticipated to reduce by 525.3 units, when the remaining variables in the model were kept constant. This result was not broadly in harmony with the expected sign and hypotheses, and there was not a complement relationship exists between the number of branches and

the health care services outreach. The MFIs' branch was not the only delivery channel for the health care services outreach. Expanding the other delivery channels generated convenience and increased accessibility of the product or service being offered by MFIs. At the same time, MFIs were often to improve the delivery channels to increase the health care services outreach, and thanks to the other distribution networks such as providing online services, contacting households, etc.

The regression result found the variable CSR had a coefficient 406.0 with the significance level of 1%. This result showed that for one unit increased in the productivity, the health care services outreach was anticipated to improve by 406.0 units, when the remaining variables in the model were kept constant. As expected, this result was broadly in harmony with the expected sign and hypotheses. Some MFIs had a high productivity over the years. A high productivity meant that MFIs focused on the numbers of customers on numbers of staff ratio to provide some common health care products and services. Therefore, they lacked the opportunities to improve the health care services outreach to meet the needs of diverse customers populations.

The model result exhibited a very significant effect of NHT on the health care services outreach, and the coefficient was positive and statistically significant at the 1% level. This result showed that for one unit increase in the diversification of health care support activities, the health care services outreach was anticipated to increase by 9508.1 units, when the remaining variables in the model were kept constant. As expected, this result was broadly in harmony with the expected sign and hypotheses, and there was a complement relationship exists between the diversification of health care support activities and the health care services outreach. The increase in the diversification of health care support activities contributed to advance the health care services outreach. Many MFIs diversified the health care support activities to meet the needs of customers in the health care support activities, and they achieved the goal of attracting as many customers as possible of MFIs. Thus, the formal MFIs achieved dual goals including the diversification of health care support activities and the health care services outreach over the years.

The regression result showed a significant effect of the operational sustainability on the health care services outreach with the coefficient was positive and statistically significant at the 10% level. This result showed that for one unit increased in the operational sustainability, the health care services outreach was anticipated to improve by 94.22 units, when the remaining variables in the model were kept constant. As expected, this result agreed with the expected sign and hypotheses, and there was a complement relationship exists between the operational sustainability and the health care services outreach. The operational sustainability was one of the suitable conditions to promote the health care services outreach. Many MFIs have taken the advantage of operational sustainability to expand operations, and improving the health care services outreach. They met the needs of customers in the health care support activities to achieve the goal of health care services outreach, and attracted as many customers as possible of MFIs.

## Conclusions

Microfinance is seen as a key health care services development tool, and despite the current deepening difficulty within the industry, it continues to grow in Vietnam. The study systematically reviewed the evidence of the impact of factors on diversification of health care support activities and the health care services outreach. This study considered impacts on diversification of health care support activities, and the health care services outreach. The available evidence showed that bidirectional interactions and the causal relationship between the diversification of health care support activities and the health care services outreach.

The study results showed that the two factors that had positive relationships with the diversification of health care support activities were the number of branches and the health care services outreach. The two factors that had negative relationships with the diversification of health care support activities were the productivity and the operational sustainability. The three factors that had positive relationships with the health care services outreach were the productivity, the diversification of health care support activities and the operational sustainability. A factor that had a negative relationship with the health care services outreach was the number of branches. The asset growth rate had a insignificant relationship with the diversification of health care support activities, and the equity growth rate had a insignificant relationship with the health care services outreach. At the same time, this study found relationships between the diversification of health care support activities, and the health care services outreach. The study found a positive bidirectional interactions relationships between the diversification of health care support activities, and the health care services outreach.

The members, customers and poor lack access to the health care services, hence reducing their capability to meet their health requirements. Lack of health care instruction prevents them from maintenance sustainability life. MFIs could be an alternative for the poor to be in a position to meet the demand for health services. They Could benefit the poor's access to health, and need to take an integrated approach to provide a full health care support activities package. This study will help researchers and managers develop their expertise on key factors of the diversification of health care support activities, and the health care services outreach, and the relationship between the two. Based on the research results, the article recommends the following to increase the diversification of health care support activities, and the health care services outreach:

*Firstly*, this study found a positive bidirectional causal interactions between the diversification of health care support activities and the health care services outreach, so that the immediate policy recommendation is for MFIs to focus more on the diversification of health care support activities, and the health care services outreach. In order for MFIs to succeed they must promote to maximize health care support activities, and attract more members and customers. At the same time, MFIs should have many combined and synchronous solutions. Because, single solutions continue to be inadequate in confronting the prevalent problems of the diversification of health care support activities, and the health care services outreach.

*Secondly*, the members, customers and poor need access to a coordinated set of the diversification of health care support activities to have better the health care services outreach. MFIs should take the advantage of operational sustainability to expand the appropriate health care support activities, they should increase the opportunities to expand the operations for the diversification of health care support activities to meet the needs of diverse customers populations, that included prevention, diagnostics, treatment instruction, nursing care and midwifery, improving the experience of care, improving the health of populations, etc. At the same time, they need appropriate solutions to restrict the trade-off between the operational sustainability and the diversification of health care support activities.

*Thirdly*, integrated microfinance and health interventions leverage networks of the members, customers and poor to improve livelihoods, promote health care and safeguard against highly cost illnesses. Non-integration of the diversification of health care support activities, and the health care services outreach can be highlighted as a limitation factor to the health care support-promoting capacity of the MFIs' operations in Vietnam. Therefore, MFIs should expand the other delivery channels generated convenience and increased accessibility of the health care support activities being offered by MFIs. MFIs need to improve the delivery channels to increase the health care services outreach, and thanks to the other distribution networks such as providing online services, contacting households, etc.

*Fourthly*, the diversification of health care support activities were to be integrated on a massive scale with microfinance services for the members, customers and poor, then the true potential of microfinance to improve the health care services outreach and offer a dignified route out of care could be realized. Thereby, the policies and strategies of MFIs should facilitate and enforce integration of health care support activities and health education components into their designs to maximize their health care support-promoting capacity.

## **Abbreviations**

AGR: Asset growth rate; BRA: Number of branches; CSR: Numbers of customers on numbers of staff ratio; EGR: Equity growth rate; FEM: Fixed effects model; MFIs: Microfinance institutions; NAC: Number of active customers; NHT: Number of health care support product and service types; OLS: Least square model; OSS: Operational sustainability; REM: Random effects model; VIF: Variance inflation factor.

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## Availability of data and materials

Please contact author for data requests

## Authors' contributions

VDH participated in the design of the study and performed the statistical analysis. PTKH conceived of the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

## Ethics approval and consent to participate

Not applicable.

## Consent for publication

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

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## References

1. Leatherman, S. and C. Dunford, *Linking health to microfinance to reduce poverty. Bulletin of the World Health Organization*, 2010. **88**: p. 470-471.
2. Zeller, M. and R.L. Meyer, *The triangle of microfinance: Financial sustainability, outreach, and impact*. 2002, Washington, D.C: International Food Policy Research Institute.
3. Schreiner, M., *Aspects of outreach: A framework for discussion of the social benefits of microfinance. Journal of international development*, 2002. **14**(5): p. 591-603.
4. Srinivasan, G., *Microfinance India: The social performance report 2013*. 2014: SAGE Publications India.
5. Primiana, I., D. Masyita, and E. Febrian, *Social outreach model and efficiency in Sharia micro finance institution: literature review. European Research Studies Journal*, 2018. **21**(3): p. 104-122.
6. Ha, V.D., *The interactive relationship between credit growth and profitability of people's credit funds in Vietnam. Accounting*, 2020a. **6**(2): p. 79-88.
7. Ha, V.D., *Microfinance: The Assess indicators and Interactive Relationship*. 2020b, Vietnam: Ho Chi Minh City Economic Publishing House.

8. Ha, V.D., *Microfinance: Operations and quantitative model*. 2020c, Vietnam: Ho Chi Minh City Economic Publishing House.
9. Hubbard, R.G., *Money, the financial system, and the economy, 6th Edition*. 2007, United States: Addison-Wesley Reading, MA.
10. Leatherman, S., et al., *Integrating microfinance and health strategies: examining the evidence to inform policy and practice*. *Health policy and planning*, 2012. **27**(2): p. 85-101.
11. Ha, V.D. *The Interactive Relationship Between the Credit Size and Financial Sustainability of The Formal Microfinance Institutions in Vietnam*. in *International Conference on Contemporary Issues in Finance, Banking and Accounting for Sustainable Development*. 2020d. Hanoi, Vietnam, Vietnam National University of Economics and Business: Science and Technics Publishing House.
12. Rauf, S.A. and T. Mahmood, *Growth and performance of microfinance in Pakistan*. *Pakistan economic and social review*, 2009: p. 99-122.
13. Rashid, A. and K. Twaha, *Exploring the determinants of the productivity of Indian microfinance institutions*. *Theoretical and Applied Economics*, 2013. **18**(12): p. 83-96.
14. Abdulai, A. and D.D. Tewari, *Trade-off between outreach and sustainability of microfinance institutions: Evidence from sub-Saharan Africa*. *Enterprise development and microfinance*, 2017a. **28**(3): p. 162-181.
15. Ha, V.D., *The Interactive Relationships in Microfinance*. 2020e, Chisinau, Republic of Moldova, Europe: Eliva Press.
16. Roodenbeke, E.d. and W.H. Organization, *Outreach services as a strategy to increase access to health workers in remote and rural areas*. 2011: World Health Organization.
17. Quayes, S., *Depth of outreach and financial sustainability of microfinance institutions*. *Applied Economics*, 2012. **44**(26): p. 3421-3433.
18. Rao, K.R.M. and T.L. Fitamo, *Concepts and Measures of Outreach and Sustainability in Microfinance Institutions (A Comprehensive Literature Review)*. *International Journal of Science and Research (IJSR)*, 2015. **4**(2).
19. Kent, D. and M.T. Dacin, *Bankers at the gate: Microfinance and the high cost of borrowed logics*. *Journal of Business Venturing*, 2013. **28**(6): p. 759-773.
20. Ha, V.D., *Impact Measurement of Microfinance Outreach*. 2020f, Chisinau, Republic of Moldova, Europe: Publishing house: Eliva Press.
21. UNESCAP, *Microfinance for Poverty Reduction: Building Inclusive Financial Sectors in Asia and the Pacific*. Vol. Development Papers No 27. 2007, Manufacture in Thailand: United Nations.
22. Sim, J. and V.V. Prabhu. *The Sustainability and Outreach of Microfinance Institutions*. in *IFIP International Conference on Advances in Production Management Systems*. 2014. Springer.
23. Unit, S.D. *What is Sustainable Health?* 2020 September 16, 2020 [cited 2020 Microfinance for Poverty Reduction: Building Inclusive Financial Sectors in Asia and the Pacific ]; Available from: <https://www.sduhealth.org.uk/policy-strategy/what-is-sustainable-health.aspx>.

24. Churchill, C.F. and C. Frankiewicz, *Making microfinance work: Managing for improved performance*. 2006: International Labour Organization.
25. Kipasha, E.F. and X. Zhang, *Sustainability, profitability and outreach tradeoffs: evidences from microfinance institutions in East Africa*. *European Journal of Business and Management*, 2013. **5**(8).
26. Hermes, N., R. Lensink, and A. Meesters, *Outreach and efficiency of microfinance institutions*. *World development*, 2011. **39**(6): p. 938-948.
27. Nanayakkara, G. and L. Mia, *Does product diversification and emphasis on profitability in microfinancing alleviate poverty? Asia-Pacific Development Journal*, 2017. **23**(1): p. 21-56.
28. Abdulai, A. and D.D. Tewari, *Determinants of microfinance outreach in Sub-Saharan Africa: A panel approach*. *Acta Commercii*, 2017b. **17**(1): p. 1-10.