

# Determinants of enrollment decision in the community based health insurance, North West Ethiopia: A case control study

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## Research article

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## Abstract

**Objective:** - To identify determinants for enrollment decision in the community based health insurance program among informal economic sector engaged societies, North West Ethiopia.

**Method:**-Unmatched case control study was conducted on 148 cases (member to insurance) and 148 controls (not member to insurance program) from September 1- October 30 2016. Stratified then simple random sampling method was employed. The data were entered in to Epi-info version 7 and exported to SPSS version 20 for analysis. Descriptive statistics, bi-variable, and multi-variable logistic regression analyses were computed to describe the study objectives and identify the determinants of enrolment decision for the insurance program. Odds ratio at 95 % CI was used to describe the association between the independent and the outcome variables.

**Result:** - A total of 296 respondents (148 cases and 148 controls) were employed. A mean age for cases and controls was  $42 \pm 11.73$  and  $40 \pm 11.37$  years respectively. Majority of respondents were males (87.2 % for cases and 79 % for controls). Family size between 4 and 6 (AOR=2.26; 95% CI: 1.04, 4.89), history of illness by household (AOR=3.24; 95% CI: 1.68, 6.24), perceived amount of membership contribution was medium (AOR=2.3; 95% CI: 1.23, 4.26), being married (AOR=6; 95% CI:1.43, 10.18) and trust on program (AOR=4.79; 95% CI: 2.40, 9.55) were independent determinants for increased enrolment decision in the CBHI. While, being merchant (AOR=0.07; 95% CI: 0.09, 0.6) decreased the enrolment decision.

**Conclusion:** - Societies enrollment decision to community based health insurance program was determined by demographic, social, economic and political factors. Households with large family size and farmers in the informal sector should be given maximal attention for escalating enrolment decision in the insurance program.

## Background

Health security is increasingly being recognized as integral part of poverty reduction effort (1). Many lower and middle income countries (LMICs) have not been able to fulfill equitable health care needs of their citizens. They faced challenges to raising sufficient funds to finance health services (2,3). Consequently; this days, they have been promoting community based health insurance program(CBHI) as a means of financing healthcare (3). However, it has not been brought a significant impact on the accessibility of healthcare because of the low level of members' enrolment (3,4).

Developing countries account 84% of the global population from which above 50% live under poverty. About 1.3 billion are rural poor informal sector workers that produced 20% of the domestic product. Additionally, 90% global disease burden were born in such countries (4,5). Although, countries had agreed in WHO general assembly of 2005 to achieve universal health coverage (UHC) through developing risk pooling mechanism (health insurance program) by reducing out of pocket payments (OPP), the experience of spending money for healthcare consumption still existed low, less than 12 % (4,5,6).

As a result, annually around 808 million peoples faced catastrophic direct health expenditure at a percentage of 10 income health expenditure ratio (6). Among peoples with catastrophic direct healthcare expenditures, 100 million were impoverished and over 90% of them had occurred in

LIMCs (7). The amount of out of pocket spending was increased through time in Ethiopia (6). In the country, 33.3 % of finance for health was generated from households' direct payments at time of healthcare utilization (8,9). The government health spending in Ethiopia was limited to be 5 % of the total gross domestic product (GDP), much lower than threshold of Alma Declaration (15%) that every nation agreed to allocate (10). According to Ethiopian health policy endorsed in 1993, ministry of health of the country developed healthcare financing strategy with a great emphasis on health insurance agenda(8,10). In the health sector transformation plan II, Ethiopian government also targeted to reduce out of pocket expenditure from 33.3 % to less than

15%, and catastrophic out of pocket health expenditure from 3% to 2.5% by designing and implementing community based health insurance (CBHI) program on 80% of districts. In the strategic plan, about 80% of communities were included to have enrollment decision for membership in the program (9). However, with the existing regional variation; only 5% of the communities were enrolled to the program, as reported in the EDHS, 2016 (11). The same was also reported by the performance statistics of Africa that from 900 million eligible people to be a member for community insurance, only two million or 0.2% was actually enrolled to the program (5,12). This assured that the amount (status) of financial pool for healthcare was minimal because of the fact that lower income countries were faced challenges to sustain the CBHI scheme among illegible populations and the scheme served only small proportion of them (13,14).

According to 2016 report of Ethiopian health insurance agency (EHIA), CBHI scheme has been started piloting in 2011 and only 30% of the communities decided to enroll CBHI program at the time of launching the pilot (10). On the other hand, the scheme was characterized by challenges not only low membership ratio but also fluctuation of membership decision which led members to dropout from the program once they had been already joined (1,3,12,15). This was witnessed by facts found in the study area, that the scheme enrolment rate was registered to be 33 % while the dropouts was 31 % (16). The study was conducted by referring program policy documents and strategies like program awareness creation process and means, administration process from village up to district level, predefined benefit packages and health service utilization process, trusts on policy as well as on the development of the programs and its sustainability (17).

Therefore, this study aims to figure out why all the targeted eligible households did not uptake and enroll into the existing scheme?

## Methods

**Study setting and period:** The study was conducted in South Achefer district between September to October 2016. South Achefer is 500 km Northeast of the capital Addis Ababa. The district was made

up of 20 villages. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), the projected total households of the district for 2016 were estimated to be 36,204. About 12,612 (35%) households were enrolled to community based health insurance. The majority of the inhabitants are farmers 85 %), 12 % are merchants and 3% are others (16).

**Study design:** An unmatched case control study

**Sample size estimation:** The sample size was computed using Epi Info™ 7 software on the basis of the following assumptions: 80% statistical power with a level of significance at 5%, Odds ratio of 2 and a case to control ratio of 1:1. The estimated final sample size was 148 for both cases and controls using the double-proportions formula. The sample size was calculated for variables: history of illness, occupation, premium loading. Hence, the largest sample size among the exposure variables was taken.

**Sampling methods and procedure:** The study was conducted using stratified random sampling method. The study population had categorized in to four strata based on the existing administration heterogeneity. Each stratum had five villages in it. However, we considered only 10 villages for this study by using lottery method. The sample size calculated was allocated to each villages using probability proportional to size, where numbers of households were used as a measure of size. The required numbers of households in each of the selected villages were drawn by simple random sampling methods from the frame found in CBHI registrar for cases and health extension family folder for controls maintained by health extension workers.

**Data collection tools and techniques:**

A structured questionnaire was used to collect data via face to face interview from the head of selected households. The questionnaire was prepared first in English and translated to Amharic and then again translated back to English to check its consistency. Five data collectors who were in charge of minimum diploma were recruited for data collection. To maintain the quality of data, pretest was conducted on 5 % of the sample size. Training was also provided for both data collectors and supervisors.

**Operational definitions:**

**CBHI membership:** When households are joining in to CBHI by paying the pre-set amount of membership contribution (money) and becoming eligible to utilize health services.

**Perceived affordability of memberships contributions:** - Perceptions of households on the pre-set contribution rate of the program fixed by the scheme (6.72\$ per annum).

**Perceived quality of service:-** the extent of the community's views on the quality of health service delivery and is measured by one item, two-point Likert scale questions.

Trust on CBHI program:- can be defined through variables such as: composition of scheme executive team, deliverability of benefit package and capacity of contract health providers.

## Data analysis

Data were entered into Epi-info V.7 and analysis was performed with SPSS V.20. Descriptive statistics was computed to describe the study objectives in terms of appropriate variables. Binary and multi-variable logistic regression analysis was performed to identify the most important variables which could determine enrolment decision in CBHI scheme. Variables with a p-value of  $\leq 0.2$  on binary logistic regression analysis were entered and further computed on the multi-variable logistic regression model. Associations between the study and outcome variables were described using odds ratio at 95% CI. The Hosmer-Lemeshow test was checked and the model adequately fitted the data at the p-value  $>0.05$ .

**Ethical considerations:** The data collection was carried out after ethical clearance and letter of permission has obtained from ethical board of Addis continental institute of public health (ACIPH) and district administration for CBHI scheme respectively. Verbal consents were also taken by data collectors from all respondents.

## Results

### Socio - demographic and enrolment profiles of respondents

A total of 296 (148 non-members & 148 members) respondents were consented to participate in this study, resulting in an overall response rate of 100 % (both for cases and controls). The mean age of cases and controls was 42 ( $\pm 11.73$  SD) and 40 ( $\pm 11.73$  SD) years respectively. Among the total households interviewed, majority (83% ) were headed by males.

Family size, occupation, marital status, income, participation in social practice, history of illness and perceived quality of services showed significant difference between the members versus the non members households, but the variables age, sex, educational status etc did not show variation between the case and control households (Table 1).

Table 1. Socio-demographic and CBHI enrolment characteristics (profiles) of study participants in North Western Ethiopia, October 2016.

Characteristics		Not Member to CBHI (%) (Controls)	Member to CBHI (%) (Cases)	Chi square, p-value
Sex	Male	117 (39.5)	129 (43.6)	$\chi^2=3.465$ , p-value= 0.063
	Female	31 (10.5)	19 (6.4)	
Age of heads	<35	43 (14.5)	32 (10.8)	$\chi^2=2.43$ , p-value= 0.29
	35 - 51	81 (27.4)	86 (29.1)	
	>51	24 (8.1)	30 (10.1)	
Educational status	Unable to read and write	44 (14.9)	40 (13.5)	$\chi^2=4.24$ , p-value= 0.374
	Have informal education	55 (18.6)	55 (18.6)	
	Primary & junior education (1-8)	27 (9.1)	39 (13.2)	
	Secondary education (9-12)	13 (4.4)	9 (3.0)	
	Above 12	9 (3.0)	5 (1.7)	
Occupation	Farmer	122 (41.2)	134 (45.3)	$\chi^2=11.04$ , p-value= 0.004
	Merchant	22 (7.4)	6 (2.0)	
	Other	4 (1.4)	8 (2.7)	
Family size	<3	37 (12.5)	34 (11.5)	$\chi^2=17.86$ , p-value= 0.001
	3 -4	15 (5.1)	14 (4.7)	
	4 - 6	47 (15.9)	69 (23.3)	
	>6	19 (6.4)	31 (10.5)	
Marital status	Single	29 (9.8)	16 (5.4)	$\chi^2=5.69$ , p-value= 0.05
	Married	116 (39.2)	125 (42.2)	
	Divorced & widowed	3 (1.0)	7 (2.4)	
Household annual income	<8000	50 (16.9)	27 (9.1)	$\chi^2=9.37$ , p-value= 0.02
	8001 - 16000	38 (12.8)	48 (16.2)	
	16001 - 28000	29 (9.8)	37 (12.5)	
	>28000	31 (10.5)	36 (12.2)	
Participate in	No	19 (6.4)	3 (1.0)	$\chi^2=12.57$ ,

ial practice	Yes	126 (42.6)	145 (49.0)	p-value= 0.001
vious (history) llness	No	59 (19.9)	34 (11.48)	x <sup>2</sup> =9.799, p-value= 0.002
	Yes	89 (30.06)	114 (38.5)	
areness of the ogram	Not aware	110 (37.16)	101 (34.12)	x <sup>2</sup> =1.34, p-value= 0.25
	Aware	38 (12.8)	47 (15.88)	
ceived quality service	Not quality	85 (28.72)	70 (23.65)	x <sup>2</sup> =3.05, p-value= 0.05
	Quality	63 (21.28)	78 (26.35)	
ected feature lth status	Good	115 (38.85)	120 (40.54)	x <sup>2</sup> =1.05, p-value= 0.60
	Worse	7 (2.36)	4 (1.35)	
	I can't expect	26 (8.78)	24 (8.11)	

#### Bi-Variable Analysis

Merchant study subjects (COR=0.14; 95% CI: 0.03,0.61) were less likely to enroll in to CBHI than subjects who were farmers. CBHI member households (Cases) (COR= 7.11; 95% CI 2.05, 24.61) were more likely to be members in social practices, richer to pay fees (COR= 2.5; 95% CI: 1.1, 4.21), married (COR=1.95; 95% CI: 1.01, 3.78) and had large family size (>6) (COR 3.22; 95CI 1.39-6.3). However, age, educational status and sex were not correlated with enrolment decision in CBHI scheme (table 2).

Table 2. Socio-demographic determinants for CBHI enrolment decision in North Western Ethiopia, October 2016.

Characteristics		Non-Member (%)	Member (%)	Crude OR (95 % CI)
	Male	117 (39.5)	129 (43.6)	0.55 (0.29 - 1.04)
	Female	31 (10.5)	19 (6.4)	1.00*
Age of heads	<35	43 (14.5)	32 (10.8)	1.00*
	35 - 51	81 (27.4)	86 (29.1)	1.43(0.82 - 2.47)
	>51	24 (8.1)	30 (10.1)	1.68(0.83 - 3.40)
Educational status	Unable to read and write	44 (14.9)	40 (13.5)	1.00*
	Have informal education	55 (18.6)	55 (18.6)	1.20(0.62 - 1.94)
	Primary & junior education (1-8)	27 (9.1)	39 (13.2)	1.59(0.82 - 3.05)
	Secondary education (9-12)	13 (4.4)	9 (3.0)	0.76(0.29 - 1.97)
	Above 12	9 (3.0)	5 (1.7)	0.61(0.19 - 1.98)
Occupation	Farmer	122 (41.2)	134 (45.3)	0.55(0.16 - 1.87)
	Merchant	22 (7.4)	6 (2.0)	0.14(0.03 - 0.61)
	Other	4 (1.4)	8 (2.7)	1.00*
Family size	<3	37 (12.5)	34 (11.5)	1.00*
	3 -4	15 (5.1)	14 (4.7)	1.84(0.79 - 4.25)
	4 - 6	47 (15.9)	69 (23.3)	2.89(1.66 - 5.04)
	>6	19 (6.4)	31 (10.5)	3.22(1.59 - 6.50)
Marital status	Single	29 (9.8)	16 (5.4)	1.00*
	Married	116 (39.2)	125 (42.2)	1.95(1.01 - 3.78)
	Divorced& Windowed	3 (1.0)	7 (2.4)	4.23(0.96 - 18.65)
Household annual income	<8000	50 (16.9)	27 (9.1)	1.00*
	8001 - 16000	38 (12.8)	48 (16.2)	2.34(1.24 - 4.40)
	16001 - 28000	29 (9.8)	37 (12.5)	2.36(1.20 - 4.64)
	>28000	31 (10.5)	36 (12.2)	2.15(1.10 - 4.21)
Participate in social practice	No	19 (6.4)	3 (1.0)	1.00*
	Yes	126 (42.6)	145 (49.0)	7.11(2.05 - 24.61)

\*significant at p-value 0.05

Even though, in bi-variable logistic regression analysis, participants who perceived the services delivered good quality were 1.5 times more likely to have decision on CBHI enrollment than subjects whose perception was poor quality, the association was not statistically significant. Perceived affordability of membership contribution (COR= 2.95; 95% CI: 1.77, 4.95) and trust on the scheme (COR= 3.81; 95% CI: 2.25, 6.46) had an increasing effect on enrollment decision for CBHI program. Study participants who had history of illness in their households (COR=2.22; 95% CI: 1.34, 3.68) were more likely to enroll in to CBHI program. However, time when membership payments made was not a determinant for enrolment decision (Table 3).

Table 3. CBHI-program related determinants for CBHI enrolment decision in North Western Ethiopia, October 2016.

Characteristics		Non-Member (%)	Member (%)	Crude OR (95 CI)
Time when membership payments made	Not-appropriate	45(57.69)	33 (42.31)	1.00*
	Appropriate	103 (47.03)	116 (52.97)	0.65(0.39 - 1.10)
Perceived quality of service	Not quality	85 (54.84)	70 (44.16)	1.00*
	Quality	63(44.68)	78(55.32)	1.50(0.95 - 2.38)
Perceived affordability of membership contribution	Expensive	70(65.42)	37(34.58)	1.00*
	Medium	61 (39.1)	95 (60.9)	2.95(1.77 - 4.92)
	Low	17(51.5)	16(48.5)	1.78(0.80 - 3.93)
Trust on the scheme	No	68(71.58)	27(28.42)	1.00*
	Yes	80 (39.8)	121(60.2)	3.81(2.25 - 6.46)
History of illness	No	59 (63.4)	34 (36.6)	1.00*
	Yes	89 (43.8)	114(56.2)	2.22(1.34 - 3.68)

\*significant at p-value 0.05

## **Multivariable analysis**

Table 4 shows independent determinants of CBHI enrolment decision. Being merchant (AOR=0.07; 95% CI: 0.09, 0.60) was an independent predictor for decreased decision to enroll in CBHI scheme. Being married (AOR= 6.0; 95% CI: 1.43, 10.18), family size between 4 and 6 (AOR=2.26, 95% CI: 1.04, 4.89), history of illness by households (AOR=3.24, 95% CI: 1.68, 6.24), perceived affordability of membership contribution was medium (AOR=2.30 95% CI: 1.23, 4.26) and trust on the program (AOR=4.79 95% CI: 2.40, 9.55) were independent determinants for increased enrolment decision in the CBHI program. However, participation in preexisting social practice and annual house hold income was not found significant in the final multivariable analysis.

Table 4: Independent determinants for CBHI enrolment decisions among households in Northwest, Ethiopia, October 2016.

Characteristics		COR (95% CI)	AOR (95% CI)
Occupation	Farmer	0.55(0.16 - 1.87)	0.58(0.08 - 3.95)
	Merchant	0.14(0.03 - 0.61)*	0.07(0.09 - 0.60)*
	Other	1.00	1.00
History of illness	No	1.00	1.00
	Yes	2.22(1.34 - 3.68)*	3.24(1.68 - 6.24)*
Trust on the scheme	No	1.00	1.00
	Yes	3.81(2.25 - 6.46)*	4.79 (2.4 - 9.55) *
Perceived affordability of membership	Expensive	1.00	1.00
	Medium	2.95(1.77 - 4.92*)	2.30(1.23 - 4.26)*
	Low	1.78(0.80 - 3.93)	1.42(0.54 - 3.75)
Family size	<3	1.00*	1.00*
	3 -4	1.84(0.79 - 4.25)	1.56(0.55 - 4.38)
	4 - 6	2.89(1.66 - 5.04)*	2.26(1.04 - 4.89)*
	>6	3.22(1.59 - 6.50)*	2.21(0.86 - 5.71)
Marital status	Single	1.00*	1.00*
	Married	1.95(1.01 - 3.78)*	6(1.43 - 10.18) *

	Divorced & Windowed	4.23(0.96 - 18.65)	0.77(0.28 - 2.14)
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## Discussion

Limited availability of health resource and its inequitable and inefficient allocation, and the existing direct payment system of it at the time of services are the main obstacles to achieve UHC, as identified by WHO (10). The total health spending in Ethiopia has been increasing since 2004. However, the expenditures in the country still considered under financed and said to be low when compared to Sub Saharan countries (10). Hence; in 1998, Ethiopia has endorsed healthcare financing strategy as a means of collecting additional resource for health in order to ensure sustainable, equitable and quality health service delivery (8). The government of Ethiopia, in its second health sector transformation plan (HSTP II), has put an insight: reduction of OPP to 15% from the total household expenditure, catastrophic health expenditure from 3% to 2.5%, increasing per capital health service utilization rate from 0.48 to 2, incorporating 80% districts and 80% of the communities in CBHI program targeting the year 2020 (9). Nevertheless, until the time of this study under taken, only 4.5% were enrolled to the CBHI program(18).

The study revealed that size of the family in household was a determinant for CBHI membership decision. This finding of the study is mirrored with a study conducted in India (3) and Nigeria (12). This might be happened due to economics rationality of human beings. The probability of getting health problem in a family depends on its size. Consequently, the more the household have larger family size, the more the tendency to join in risk pooling institutions (associations). On the other hand, the result found in the current study contradicted with finding of a study conducted in Burkina Faso (19). This difference could be attributed to mechanisms of calculating expected amount of contribution paid from every household for membership in an insurance package. In Burkina Faso, the membership contribution in an insurance scheme was estimated per a head in household which laved large amount of money as family size increased, contrary to what was happened in Ethiopia (17). This might create financial burden on the families with large size and that is why the enrolment decision in such kind of families was eroded. In Ethiopia, membership contribution was computed per a household irrespective of family size (flat rate payment system). This connection was also highly strengthen by the results found from the current study and existing literatures (20,21) that revealed being married increased households' enrolment decision to any insurance institution. This can be explained by the fact that the payment policy of the households' membership contribution in Ethiopia has not taken in to consideration of the marital position (17).

Households' previous history of health problem was a likely determinant for enrolment decision, consistent with previous studies (1,12). The studies conducted in Ghana and India had shown that families with an illness at least in one member in the past one year were more likely to will to enroll in to insurance scheme than the counterparts and that witnessed the effect of adverse selection on enrolment decision. The more households experience health problems, the more expense they would make for each healthcare consumed and thus households decide to enroll in to any risk pooling programs because of fearing future expensive health expense when family members might get in to sick (1,12), However this finding is contradictory to a the study conducted in Burkina Faso (22). This inconsistency might be due to the fact that households' apprehensions (suspections) about the compromization of quality of service they would consumed during the enrolment time. This was also explained that the CBHI program holders in Burkina Faso could make contractual agreement with less trusted healthcare facilities. In other words, for the same level of healthcare delivery, there might not had significant difference in the amount they will contribute to the scheme membership and the amount they will pay to health facility at a time of sickness. In the area where this study was undertaken, the premium loading was highly subsidized by the government while private consumption of healthcare service were expensive is also the likely explanation for this difference.

Any insurance schemes were conceived, developed or stewardship by private agencies, selected community members and government representatives. CBHI which, is the mechanisms of distributing risks among members, was initialed by government targeting on informal sectors. In any activity, trusting the desirable result of a decision about is a prerequisite to accomplish anything chosen. The personnel involved in the scheme administration and decision process as well the way the government lead/ hand the program should be trusted by the community. This truth was actually proved by the findings of the current study such that trusting the CBHI scheme was a determinant for increased enrolment decision in the insurance program. Other studies conducted in Cameron, Nigeria, Cambodia and Ghana also reported the issue in the same manner what was found in the current study (5,12,23). In Ethiopian CBHI scheme, the contribution (premium) was collected from the households at the pre-set flat rate amount. That is equal amount of money was laved from everyone without taking in to consideration of any characteristics of the households including richness or poor and family size etc. However, when the contribution rate was made flat automatically; it became more regressive irrespective of households' income status. Thus, it was expensive for the poor and laid financial burden on them. This kind of characteristics of the scheme will restrict the rate of decision for membership made by the poor in similar kind of insurance packages. Our study also highly supported this reality households' their perceived affordability of contribution was medium were more likely to enroll in to insurance scheme as compared to its counter parts. Similarly, results of the studies conducted in

Ghana (1), Mali (13) and Senegal (19). reported flat rate system premium loading restricted enrolment decision of the poor (1,15). This study was not conducted without any limitations although we tried to minimize it. Information and recall bias related household income and perception might affect accuracy of the study.

## Conclusions

Society's enrollment decision to community based health insurance program was determined by demographic, social, economic and political factors. Households with large family size and farmers in the informal sector should be given maximal attention for escalating enrolment decision in the insurance program. This study reaffirmed that standardizing affordability of amount of membership contribution by households and building trust of them on the program are some of the best strategies for increasing enrolment decision in informal sectors. Community mobilization and awareness creation of CBHI was also commendable. The findings of the study also provide impetus to intensify the influence of adverse selection on such scheme enrolment rate. Thus, much emphasis has to be given to households with an experience of previous illness during the time of initiation, expansion and promotion of the program.

## Abbreviations

CI=Confidence interval, CBHI=Community based health insurance, AOR=Adjusted odds ratio, SPSS=Statistical package for Social Science, AOR=Adjusted Odds ratio, LMICs- Lower and middle income countries, WHO= World health organization, UHC= Universal health coverage, OPP=Out of pocket payment, GDP, Gross domestic product, EDHS= Ethiopian demographic and health survey, EHIA=Ethiopian health insurance agency, CSA=Central statistical authority, SD= Standard,  $X^2$ = Chi-square test, COR=Crude odd ratio, HSTP=Health sector transformation plan, ACIPH= Addis continental institute of public health

## Declarations

**Ethics approval and consent to participate:** This study was approved by the ethical committee of Addis Continental Institute of Public Health. Written and verbal informed consent from the study participants was also obtained before conducting this study.

**Consent for publication:** Not applicable.

**Availability of Data and Materials:** Data of this study are available without restriction. Contact to this e-mail: [destad2a@gmail.com](mailto:destad2a@gmail.com) when needed.

**Competing Interests:** The authors have declared that no competing interests exist.

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**Authors' Contributions:** Conceived and designed the experiments: GT, DD, AK, and YA. Performed the experiments: GT, DD, AK, and YA. Analyzed the data: GT, DD, AK and YA. Contributed materials/analysis tools: GT, DD, AK and YA. Wrote the paper: GT, DD, AK and YA. All authors have read and approved the final version of this manuscript.

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