

## ORIGINAL RESEARCH ARTICLE

# Effect of Volunteer Household Counseling in Improving Knowledge of Birth Preparedness and Complication Readiness of Pregnant Women in Northwest Nigeria

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## Abstract

Maternal and Child Health Integrated Program (MCHIP), a program by Jhpiego global, implemented maternal and newborn health project between 2006 and 2010 in Kano and Zamfara States, Nigeria. This was evaluated with an objective to characterize the effects of volunteer household counselors (VHCs) upon improving knowledge of birth preparedness and complication readiness (BPCR) among pregnant women. VHCs were trained to educate women and their families at home about BPCR. Knowledge of BPCR was compared among 152 and 594 women who did and did not receive household counseling. Mothers' knowledge of BPCR among those who did and did not receive counseling was 32.2% and 11.2% respectively. Mothers who received counseling had better knowledge of BPCR compared to women who did not (Relative Risk [R.R.] 2.30, 95% [C.I.] 1.50, 3.51,  $P = 0.0001$ ) in a multivariable logistic regression model adjusting for potential confounders. Mothers who received counseling had better odds of knowledge of danger signs during delivery (R.R. 1.48, 95% C.I. 1.05, 2.09,  $P = 0.02$ ), and post-partum period (R.R. 1.69, 95% C.I. 1.22, 2.32,  $P = 0.001$ ), but not during pregnancy (R.R. 1.26, 95% C.I. 0.97, 1.64,  $P = 0.08$ ), compared with women who received no counseling. VHCs can substantially increase knowledge of BPCR and danger signs among women in Nigeria. (*Afr J Reprod Health* 2017; 21[1]: 39-48).

**Keywords:** Birth preparedness, maternal, newborn, health, Nigeria, VHCs

## Résumé

Le Programme intégré de santé maternelle et infantile (PISMI), un programme assuré par Jhpiego, un projet de santé maternelle et néonatale réalisé globalement entre 2006 et 2010 dans les Etats de Kano et de Zamfara au Nigeria. Ce travail a été évalué dans le but de caractériser les effets des conseillers à domicile bénévoles (CDB) sur l'amélioration des connaissances par rapport à la préparation à la naissance et à la préparation face à aux complications (PNPC) chez les femmes enceintes. Les CDB ont été formés pour éduquer les femmes et leurs familles à la maison au sujet de la PNPC. La connaissance de PNPC a été comparée auprès des 152 et 594 femmes qui ont reçu et qui n'ont pas reçu la consultation à domicile. Les connaissances des mères sur la PNPC parmi celles qui ont reçu ou non pas reçu la consultation étaient de 32.2% et 11.2% respectivement. Les mères qui ont reçu une consultation ont une meilleure connaissance du PNPC comparées aux femmes qui ne l'ont pas reçue. (Le Risque Relatif [R.R.] 2,30, 95% [C.I.] 1,50, 3,51,  $P = 0,0001$ ) dans un modèle de régression logistique multivariée en ajustant les facteurs de confusion potentiels. (RR 1,48, IC 95% 1,05, 2,09,  $P = 0,02$ ) et période post-partum (RR 1,69, IC 95% 1,22, 2,32,  $P = 0,001$ ), mais pas pendant la grossesse (RR 1,26, IC à 95% 0,97, 1,64,  $P = 0,08$ ), comparées aux femmes qui n'ont reçu aucune consultation. Les CDB peuvent augmenter considérablement la connaissance de la PNPC et des signes de danger chez les femmes au Nigeria. (*Afr J Reprod Health* 2017; 21[1]: 39-48).

**Mots clés:** Préparation à la naissance, maternelle, nouveau-né, santé, Nigeria, CDB

## Introduction

Although Nigeria comprises only 2.4% of the world's population of 7 billion, it contributes

about 19% to the world maternal mortality of 303,000 and had the highest burden of maternal deaths in 2015<sup>1</sup>. According to the 2013 Nigeria Demographic and Health Survey (NDHS) report,

the national maternal mortality ratio (MMR) is estimated at 576 per 100,000 live births<sup>2</sup>. Furthermore, for every woman or girl who dies, another 20-30 women and girls suffer short- or long-term disabilities such as obstetric fistula, ruptured uterus, obstetric neuropathy, chronic pelvic pain resulting from pelvic inflammatory disease and secondary infertility<sup>2</sup>.

The high MMR and neonatal mortality rate (NMR) in Nigeria are, in part, a reflection of the low utilization of maternal and newborn services largely due to low education and inadequate availability and accessibility of these services<sup>3</sup>. Educational levels of females are low, with only about 60% having at least some primary school education, a variable known to be associated with access to care<sup>23</sup>. With a total fertility rate of 6.7 in the Northwest region, higher than the national average of 5.5, women are repeatedly exposed to the risks associated with childbearing as 64% of childbirths occur at home<sup>2</sup>. A skilled birth attendant (defined as Doctor, midwife or nurse) was present at approximately 38% of births, while traditional birth attendants TBA (defined as women who assist mothers during childbirth and acquired skills through apprenticeship) and relatives attended 22% and 23% of all births, respectively<sup>2</sup>. Northwest Nigeria has the lowest rate of deliveries by skilled birth attendants among the six geopolitical zones in the country: only 12.3% of women delivered with a skilled attendant while 34% delivered with a TBA and 24% delivered with a family member. Furthermore, only one out of every six women who delivered outside a health facility received postpartum care within two days of birth<sup>2</sup>. This is significant as about one-third of most neonatal deaths occur on the first day of life while the majority of maternal deaths occur during labour, delivery or within the first 24 hours after delivery.

Several factors account for the poor access to emergency obstetric and newborn care. Apart from the dearth of medical facilities, lack of skilled birth attendants and 24 hours coverage of staff for deliveries, various socio-cultural factors are responsible for the delay in seeking health care for pregnancy and delivery. A variety of delays in

seeking care have been recognized, namely: (1) delay in identifying the complication, (2) delay in deciding to seek care, (3) delay in reaching a health facility for care, and (4) delay in receiving adequate and appropriate treatment after reaching the health facility<sup>4-8</sup>.

Studies suggest that by working with the community, individuals and groups can be empowered to identify problems and derive solutions that work in the local context<sup>9-16</sup>. Examples of such community engagement efforts include the use of volunteers as peer educators, assistance with transport systems for emergencies, arrangement of community loans schemes and linkages to health facilities. Birth preparedness and complication readiness (BPCR), a process of planning for normal birth and anticipating the actions needed in case of an emergency<sup>15,16</sup> have been implemented in many countries.

The BPCR concept includes knowing danger signs, planning for a skilled attendant at birth, selecting an appropriate birth location, arranging transportation, identifying a blood donor, and saving money in case of an obstetric complication<sup>10</sup>. BPCR helps to address 'delays 1, 2 and 3' identified above. Birth preparedness and complication readiness has been examined in several different developing countries<sup>17-22</sup>. MacPherson and colleagues, in a study to determine the effectiveness of the Birth Preparedness Package (BPP) to positively influence planning for births, household-level behaviors that affect the health of pregnant and postpartum women and their newborns, and their use of selected health services for maternal and newborn care, concluded that the BPP can positively influence knowledge and intermediate health outcomes, such as household practices and use of some health services<sup>23</sup>.

In Nigeria, Onayade et al showed that 61% of pregnant women attending antenatal clinics in selected facilities made adequate preparations for delivery while only 4.8% were ready for emergencies or complications<sup>24</sup>. Another study by Ekabua and colleagues concluded that although awareness of the concept of birth preparedness was high in Southeast Nigeria, recognition of key

danger signs in pregnancy was poor<sup>25</sup>. Proportion of births attended to by skilled attendant was also low. Educational level, marital status, and parity (defined as number of times that a woman has given birth to a fetus with a gestational age of 24 weeks or more regardless of whether the child was born alive or was stillbirth) were not good predictors of the intention to attend at least four ANC visits with a skilled provider. The knowledge of available community support systems was also very poor<sup>25</sup>. Another study by Iliyasu et al<sup>26</sup> in 2010 emphasized the need to increase involvement of men in their partner's maternity care through peer-led, culturally-sensitive community education and appropriate health system reform<sup>26</sup>.

Maternal and Child Health Integrated Program evaluated in this study was implemented in Kano and Zamfara states, Nigeria between 2006 and 2010. The interventions aimed at improving maternal and newborn health. It was funded by the United States Agency for International Development (USAID). The objective of this paper is to characterize the effect of volunteer household counselors upon improving knowledge of BPCR among pregnant women in northwest Nigeria.

## Methods

### *Study participants*

Participants for this study consisted of women who had delivered babies twelve months prior to being seen. The study compared women who did not receive counseling (396 in 2006 and 198 in 2010) and women who did receive counseling (152 in 2010) from volunteer household counselors. The total number of study subjects was thus 746 postpartum women who resided in four local government areas, Dawaki Tofa and Gezewa in Kano State, and Gusau and Kaura Namoda in Zamfara State in Northwest Nigeria. Zamfara and Kano states were selected as the sites for this study because they have the highest maternal mortality rates in this region of Nigeria. Five enumeration areas were randomly selected by officers of the

Federal Bureau of Statistics within each of the four local government areas of the two states. Eligible women were selected using a multi-stage sampling procedure. Enumeration area data were used to select the clusters and households. Households within each enumeration area were screened using a household questionnaire. The head of the household indicated the number of people in the household, from which eligible women, defined as having a child <1 y of age, were selected. Women who delivered in the last 12 months were the targets of the study. They were selected randomly within households in the housing units of the community.

### *Study design*

The study design was cross sectional. The study design compared knowledge of BPCR among women who received household counseling from trained volunteer counselors in the ACCESS project versus those who did not receive household counseling. Surveys were conducted at the household level in November-December 2006 and in June-July 2010. The household surveys were designed to ascertain knowledge, practices and coverage associated with evidence-based maternal and newborn health care behaviors and services. Data collection instruments were based upon validated data collection tools and processes from DHS questionnaires and previous BPCR surveys<sup>27</sup>.

### *Data collection*

Centralized data collection training was done in Kano for all data collectors that conducted the interviews in the two states both in 2006 and 2010. In addition to the data collectors, 4 supervisors, 2 per state were also trained. The training was done in October, 2006 and April 2010 respectively for the 2 rounds of data collection. Data collectors were nurses and midwives while the supervisors were staff of Federal Bureau of Statistics. Data collectors administered the questionnaires verbally during the interviews at home with the selected women.

### ***The study tool/questionnaire***

The questionnaire consisted of closed ended questions divided into 12 sections. The questionnaire covered topics on respondents' knowledge and reported practices for birth preparedness and complication readiness at the individual, family and community levels (including planning to have a skilled attendant at birth, organizing transportation in the case of a normal or emergency birth, and saving money for normal or emergency births); knowledge/awareness of danger signs for the mother before, during and after childbirth and for newborn care immediately after birth; knowledge and reported practices regarding family planning and healthy timing and spacing of pregnancies; knowledge and reported practices regarding antenatal care, including iron supplements, tetanus toxoid vaccinations, and utilization of stated practices to protect against malaria during pregnancy.

### ***Intervention: volunteer household counseling***

The ACCESS/MCHIP Project involved both community-based and health facility-based interventions. At the community level, 80 female community health extension workers were selected by their communities based upon their willingness to serve the community and devote two additional days per week as volunteers without remuneration. The volunteers are Community Health Extension workers with diploma certificate in Community Health. They reside in the catchment communities of the health facilities and are members of existing community development groups/associations. They are selected through their respective development groups/associations with selection criteria indicating voluntarism, education level, and willingness to work during weekends. They are all women within the age range 25 to 35 years. Volunteers were trained for 2 weeks generally in emergency obstetrics and newborn care. BPCR training lasted one week and included didactic sessions and practical assessment through

simulations. The trained volunteers, who were all female, were equipped with maternal health and family planning counseling flipcharts, activity registers, referral slips, carrier bags and a branded hijab (Muslim veil). The volunteers visited pregnant women and their families at home to educate them about the danger signs in pregnancy, during and after childbirth and in the newborn by going through an entire flipchart (Supplementary data) that contained standardized messages about BPCR and family planning. Pregnant women and their immediate family members were also informed about the need to immediately go to the clinics closer to them if they observe any danger signs. Members of the families through the word development committees were connected to the official of the State Branches of Road Transport Workers for necessary transportation supports. The volunteers conducted household visitations twice every week on monthly basis and mostly in the evenings. In all a total of 3840 visits were made to pregnant women with an average of 48 visits throughout the duration of the interventions. The activities of the volunteers were rounded up March, 2010 in preparation for the evaluation was conducted in April of the same year.

### ***Ethics***

Oral consent was obtained from all study participants. Verbal informed consent was considered appropriate and was approved by the ethical committees/institutional review boards for this study. The protocol of this study was approved by the Western Institutional Review Board and by the Federal Ministry of Health of Nigeria and consent of the state governments of Kano and Zamfara States.

### ***Evaluation of maternal knowledge of birth preparedness and complications readiness***

Four major issues were considered to be important in preparing for birth by a pregnant woman and knowledge of these was assessed using composite scores. The four issues were: (1) client identified a mode of transport for birth, (2) client saved money for birth, (3) client identified a blood donor, and

(4) client identified a skilled health care provider. For each of the four individual elements, all the “Yes” responses were scored 1 while “No” responses were scored 0. The total expected score was 4. The scores obtained were classified as *Low knowledge* for those who scored 0-1 and *High knowledge* for those who scored between 2-4. A similar type of categorization has been used in other related studies<sup>21</sup>.

Mothers were asked to spontaneously cite danger signs during pregnancy, childbirth, the immediate post-partum period, and for the newborn (four separate questions). “Correct” responses were chosen by clinical experts of the ACCESS Program and included the following. For pregnancy: bleeding, severe headache, trouble with vision, fever, swollen hands or face, and reduced or accelerated fetal movement. For childbirth: abdominal pain, prolonged labor, premature rupture of membranes, severe bleeding immediately after birth, and trouble with vision. For postpartum: severe bleeding, immediately after birth, severe headache, trouble with vision, fever, swollen hands or face, malodorous vaginal discharge, loss of consciousness, difficulty breathing, and severe weakness. *Low knowledge* of the respective danger signs was defined as 0-3 correct responses, and *High knowledge* was defined as  $\geq 4$  correct responses.

### **Statistical analysis**

Women who received the volunteer household counseling in the ACCESS/MCHIP project were compared with women who did not receive the household counseling (all women in the November-December 2006 survey and women who did not receive household counseling as ascertained in the June-July 2010 survey). Chi-square tests were used to compare proportions of categorical variables between women who did and did not receive volunteer household counseling. The main outcome measure for the regression analysis was knowledge of BPCR, scored as higher knowledge (score 2-4) versus lower knowledge (score 0-1). Secondary outcome measures were correct identification of the four

elements of birth preparedness and high knowledge of the dangers signs during pregnancy, delivery, and post-partum period. The exposure was volunteer household counseling. Multivariable logistic regression models were used to examine the relative risk (RR) of volunteer household counseling and other covariates with knowledge of BPCR, knowledge of the danger signs during pregnancy, during and after delivery, and for the four respective components of BPCR. Age, literacy, education, parity, and residence were included as covariates in the model since these were either significant or of borderline significance ( $P = 0.06$  for age and education) in bivariate analyses comparing women who did and did not receive counseling. All analyses were conducted using SAS (version 9.1.3; SAS Institute, Cary, NC) with a type I error of 0.05.

### **Results**

The demographic characteristics of 594 women who did not and 152 women who did receive volunteer household counseling are shown in bivariate analyses in Table 1. Women who received volunteer household counseling had significantly lower literacy, lower education, higher parity, and were more likely to come from a rural setting compared with women who did not receive volunteer household counseling. There were no significant differences in age, education, or location by state between the two groups. There were also no significant differences in age, literacy, education, parity, residence, or state between the women who did not receive counseling in 2006 and in 2010.

The proportion of mothers with better knowledge of BPCR among those who did and did not receive volunteer household counseling was 32.2% and 11.2%, respectively. The relationship of volunteer household counseling and other factors with knowledge of BPCR were examined in a multivariable logistic regression model that adjusted for potential confounders such as age, literacy, education, parity, and setting (Table 2). Volunteer household counseling was associated with significantly higher R.R. of knowledge of

BPCR. Those who received volunteer household knowledge of BPCR than those who did not. counseling are twice likely to have higher Literacy level, categorized into three based on the

**Table 1:** Bivariate Analyses of Demographic Characteristics of Women did not and did receive a Volunteer Household Counselor Home Visit

Characteristics	No counseling (n=594)	Received Counselling (n=152)	p-value
Age, y	<20	14.3	0.06
	20-34	74.9	
	≥35	10.8	
Literacy	None	11.7	0.0001
	With difficulty	16.6	
	Easily	71.7	
Education	None/Koranic	44.2	0.06
	Formal	55.8	
Parity	1	22.0	0.005
	2-3	36.6	
	4-5	26.1	
	6+	15.3	
Residence	Rural	18.7	0.005
	Urban	81.3	
State	Kano	51.4	0.30
	Zamfara	48.6	

**Table 2:** Multivariate Logistic Regression Model of the Relationship between the Volunteer Household Counseling and Knowledge of Birth Preparedness and Complication Readiness among Post-partum Women in Northwest Nigeria<sup>1</sup>

Characteristic	RR	95% CI	P
Received volunteer household counseling	2.30	1.50, 3.51	<0.0001
Age <sup>2</sup>	<20	0.53	0.20, 1.39
	20-34	1.08	0.58, 2.01
Literacy <sup>3</sup>	Easily	2.91	1.65, 5.13
	With difficulty	1.53	0.88, 2.68
Education <sup>4</sup>	Formal	1.19	0.73, 1.92
Parity <sup>5</sup>	2-3	0.44	0.26, 0.76
	4-5	0.48	0.27, 0.84
	6+	0.52	0.26, 1.03
Residence <sup>6</sup>	Rural	1.79	1.20, 2.67

<sup>1</sup>Dependent variable is higher knowledge (score 2-4) compared with lower knowledge (score 0-1) of BPCR.

<sup>2</sup>Reference group is age ≥35 y.

<sup>3</sup>Reference group is none.

<sup>4</sup>Reference group is none/Koranic.

<sup>5</sup>Reference group is 1.

<sup>6</sup>Reference group is rural.

responses to the ability of the mothers to read a letter or newspaper, is significantly associated with the risk of higher knowledge of BPCR. Higher literacy level has 2.6 odds of higher knowledge of BPCR than those who cannot read at all. Greater parity is associated with lower R.R. of higher knowledge of BPCR. Mothers who reside in rural

area have significantly lower R.R. of higher knowledge of BPCR than those in urban areas. However, age and education were not significantly associated with knowledge of BPCR. Since antenatal clinic attendance could also potentially influence knowledge of BPCR, an additional multivariable logistic regression model was run

that included antenatal clinic attendance in addition to the covariates above. After inclusion of antenatal clinic attendance, volunteer household counseling remained significantly associated with higher knowledge of BPCR (R.R. 2.30, 95% C.I. 1.50, 3.51,  $P < 0.0001$ ).

The percent difference in the proportion of women who had a high knowledge of transport, saving money, identifying a blood donor, and identifying a skilled provider between those who did and did not receive counseling was 21.1, 41.2, 6.9, and 24.9%, respectively. Separate multivariable logistic regression models were used to examine the relationship between volunteer household counseling and the four separate elements of BPCR. Volunteer household counseling was associated with identifying mode of transport (R.R. 2.26, 95% C.I. 1.48, 3.43,  $P < 0.0001$ ), saving money (R.R. 1.91, 95% C.I. 1.49, 2.44,  $P < 0.0001$ ), identifying a skilled provider (R.R. 3.22, 95% C.I. 1.94, 5.33,  $P < 0.0001$ ), but not identifying blood donor (R.R. 1.54, 95% C.I. 0.68, 3.47,  $P = 0.29$ ), in separate, respective multivariate logistic regression models that adjusted for the same potential confounders as above.

The percent difference in the proportion of women who had a high knowledge of BPCR during pregnancy, delivery, and after delivery between those who did and did not receive counseling was 15.2, 10.4, and 17.6%, respectively. The relationship of volunteer household counseling and other factors with knowledge of danger signs were examined in separate multivariable logistic regression models that adjusted for potential confounders such as age, literacy, education, parity, and setting. Volunteer household counseling was associated with knowledge of danger signs during delivery (R.R. 1.48, 95% C.I. 1.05, 2.09,  $P = 0.02$ ), and post-partum period (R.R. 1.69, 95% C.I. 1.22, 2.32,  $P = 0.001$ ), but not during pregnancy (R.R. 1.26, 95% C.I. 0.97, 1.64,  $P = 0.08$ ), in separate, respective multivariate logistic regression models that adjusted for the same potential confounders as above.

## Discussion

The present study shows that women who received volunteer household counseling had significantly greater knowledge of BPCR (more than two-fold greater) compared with women who did not receive the counseling. In addition, high knowledge of the danger signs during delivery and the post-partum period was greater among women who received volunteer household counseling. This study suggests that community-based volunteer counselors can substantially increase women's knowledge of BPCR.

Of the four elements of BPCR, volunteer household counseling had the greatest apparent impact on knowledge of saving money for the delivery, identifying a mode of transportation, and identifying a skilled provider, but was not significant for identifying a blood donor. These findings are consistent with observations from India<sup>28</sup> and Ethiopia<sup>20</sup>. Volunteer household counseling more than doubled the proportion of women who had knowledge of each of these elements of BPCR.

In other settings in developing countries such as Kenya<sup>17</sup>, Uganda<sup>18</sup>, Ethiopia<sup>20</sup>, Southwest Nigeria<sup>24</sup>, and Burkina Faso<sup>29</sup> knowledge of birth preparedness and complication readiness among pregnant women and their families has been relatively low and consistent with the women who never received any volunteer household counseling in the present study. Women with lower literacy, higher parity, and residing in rural setting had significantly lower knowledge of BPCR. These findings suggest that these women are at the highest risk and might benefit the most from volunteer household counseling.

A limitation of this study is the women were separated by one year period to the evaluation; therefore, the extent to which they will respond to some questions on past decisions might not be very accurate. It is possible that other factors besides household volunteer counseling may have improved maternal knowledge of BPCR during this period. However, in the study communities, there were no other public health programs,

outreach, or interventions conducted during the intervening period aimed at improving maternal knowledge of BPCR. The present study is limited in that the findings cannot necessarily be extrapolated to all the six geo-political zones of the country or other countries in the region. Since responses were based on self-reporting of knowledge up to one year after child birth or after delivery, there could be recall errors. However, there is no reason to believe that recall would be different among women who did or did not receive volunteer household counseling. It is however important to note that the study design and the outcomes essentially form the basis for generating public health planning and decision making. The study design also provided opportunity to examine the effects of the interventions on women who received information on BPCR and those that did not receive at the same time.

## Recommendations

The importance of facility and community partnerships in improving maternal and newborn health cannot be over-emphasized. This strategy should form part of the National Health Policy that should be promoted nationwide in order to raise awareness about BPCR as a first step towards increased utilization of health facilities for skilled birth attendance and a reduced maternal mortality ratio in Nigeria. While the Community Health Extension Workers (CHEWs) are trained to spend most time in the communities and household, it is ironic to note that in the states where the evaluation was conducted, many of them are working in health facilities. The results of this evaluation revealed the need for the government at state levels to enact laws that will ensure that CHEWs work more at community level on weekly basis. One of the barriers identified by the ACCESS/MCHIP project was the delay in making decisions without the husband's consent. The project has trained male counselors who are responsible for interacting with men in communities on issues related to male participation in maternal and newborn health

issues in the communities. It is therefore important for programs design to address the health needs of women and their children evolve effective strategies of promoting male participation. In order to address the issue of women getting to the health facilities on time, arrangements were made with the local road transport unions. The unions took up the responsibility of transporting women to health facilities gratis when their services are needed. Since delay in getting to health facilities is a major problem, program should consider an appropriate means of getting access to the health facilities on time. The ongoing national Midwifery Service Scheme being implemented by the National Primary Health Care Development Agency (NPHCDA) with full funding by the Federal Government of Nigeria provides a convenient platform for this scale-up.

## Conclusion

This study showed that in an area with a program that used female volunteer household counselors to educate pregnant women and their families on birth preparedness and complication readiness, there was an association of improved knowledge with 3 of 4 BPCR, and of danger signs during delivery and the post-partum period, but not danger signs during pregnancy.

## Contributions of Authors

Gbenga Ishola: Conceptualized the initial idea, topic and data analysis

Olufunke Fayehun: Conceptualized initial idea and topics and initial and further analysis

Uche Isiugo-Abanihe: Reviewed results and discussed outcomes of the research

Tunde Segun: Reviewed the program interventions section

Samaila Yusuf: Reviewed the program interventions section

Orji Bright Clement: Reviewed the results

Barbara Rawlins: Reviewed the results and discussion sections

Emmanuel Otolorin: Reviewed results and discussed outcomes of the research.

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