

【論文】

## Impact of Positive Deviance Approach on Project Sustainability for Malaria Elimination in Cambodia

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### Abstract

Malaria prevention requires sustained preventive behaviors. However, as incidences decrease in pre- and elimination settings, people feel less threatened and cease taking the necessary actions. This has resulted in increased attention on interventions that have proved to be sustainable. One such intervention is the Positive Deviance (PD) approach. However, its diverse applications in practical settings have confounded attempts to understand how this approach works and what its long-term effects are. Therefore, the present study focuses on the malaria control project in Cambodia through a qualitative approach to explore the process of change the target populations experienced over a ten-year period after the project to add to our understanding of these. The qualitative data were obtained through Key Informant Interviews and Focus Group Discussions with study participants at the target three villages of the original pilot project. Then, the Shediac-Rizkallah model and thematic analysis respectively identified the degree of sustainability and its factors. Based on these findings, even though the uniqueness of behaviors promoted were not remembered as unique by the participants, the PD behaviors and some of pilot activities have continued. The three reasons identified were: 1) recognition of being sick as a risk, 2) recognition of the applicability of these behaviors to other mosquito-related problems, and 3) continued education with consistent messages and attendance. These suggest that 1) the study participants experienced a Health Belief Model-like process of change over the ten-year period, and 2) the uniqueness of the behaviors to be adopted itself is not the only requirement for sustainability for issues, where vector control is somewhat established.

**Keywords:** Positive Deviance, Long-term effects, The process of behavior change, Qualitative study, Thematic analysis, Malaria prevention

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## List of Abbreviation

Abbreviation	Definition
AR	Artemisinin Resistance
BMGF	Bill & Melinda Gates Foundation
CAP-Malaria	Control and Prevention of Malaria Project
CMEP	Cambodia Malaria Elimination Project
COREQ	Consolidated Criteria for Reporting Qualitative Research
FGD	Focus Group Discussion
HBM	Health Belief Model
KII	Key Informant Interview
MEAF	Malaria Elimination Action Framework
MMP	Mobile and Migrant Population
MMW	Mobile Malaria Worker
NMCP	National Malaria Control Program
OP	Operational District
PD	Positive Deviance
PMI	President's Malaria Initiative
REC	Research ethics Committee
RDT	Rapid Diagnostic Testing
SES	Socio-Economic Status
SPL	Sampov Luon
USAID	U.S Agency for International Development
VMW	Village Malaria Worker

## 1. Introduction

Public health activities, such as health promotion and disease prevention, require people to vigilantly maintain preventive and health-seeking behaviors, the success of which often necessitates behavior change in a majority of the affected population (Shediac-Rezkallah & Bone, 1998). This could be especially true for the case of malaria. While malaria prevention requires people to keep taking preventive behaviors, such as correct mosquito net use, people feel less threatened in pre- and elimination settings as the number of malaria incidences decrease and cease taking preventive actions, which ultimately results in reintroduction of the disease (Tynan et al., 2011). As a result of the vigilance integral to behavior change, practitioners, researchers, policy makers, and funders have paid attention to the evidence-based intervention that has also proved to be highly sustainable (Chambers, et al., 2013; Scheirer & Dearing, 2011; Shediac-Rezkallah & Bone, 1998).

One such intervention, which has raised great attention through the recent fervor for sustainability, is the Positive Deviance (PD) approach (Lapping et al., 2003; Ong, et al., 2016). This is an asset based and community-driven approach for behavioral change; paying attention to the deviant individuals who have the same socio-economic status (SES), resources, and risk factors as other members within a target community or group but contrastively are able to avoid the same problem (Baxter & Lawton, 2022; Marsh et al., 2004; Pascal et al., 2010). Identifying their atypical but advantageous behavior(s) within the target population by themselves and spreading these to the rest of the community or group is the goal. This approach utilizes already existing solution(s) within the community via people and resources from within the community itself - said to promote acceptability amongst the community members, group ownership of the problem and solution, community's problem-solving skills - and thus highly sustainable (Bullen, 2012).

An issue in practice, understanding how this approach works is complicated by its multifarious nature. This nature has allowed for it to be applied in over 60 countries to 30 million individuals with demonstrated effectiveness across various fields (Albanna & Heeks, 2019; Pascale, et al., 2010). It is worth noting that, in practical settings, numerous definitions of "positive deviance," diverse steps of the approach, different levels of target, and different degree of community involvement have been applied to these projects (Baxter & Lawton, 2022; Bullen, 2012). In addition, this approach shares many similarities with other approaches

and theories in public health such as participatory approach, asset-based approach, Social Learning Theory, and but not limited to salutogenesis model (Bullen, 2012; Mittelmark, et al, 2016). However, clearly defined distinctions between these approaches versus the PD approach and/or its specific theoretical base have yet to be developed.

At the same time, another issue to be considered is that there have been very limited attempts to assess the long-term effects and sustainability by investigating how these interventions have affected the target populations (Baxter & Lawton, 2022; Bullen, 2012). Understanding the influence of one approach or project in a process of one's behavior change in the long-term is particularly important for the issues that require substantial time to resolve (Farrington et al., 1998). Moreover, taking into consideration the influence from other interventions implemented to the target populations is also indispensable because it is most likely the case that these populations experienced multiple interventions simultaneously (Farrington et al., 1998). While generalizing a pathway to the long-term effect of the PD approach would be unrealistic due to the diverse variations applied and numerous outside influences affected, it would be highly beneficial to explore the mechanism of change for each case to identify common factors that promote long term effects and facilitate sustainability. The objective of the present study, thus, was to use the malaria control project in Cambodia with the PD approach (hereinafter referred to as PD pilot malaria project) to explore the process of change the target populations have experienced over 10 years after project completion to shed light on how this approach works and its sustainability.

## **2. Methods**

### **2.1. Study design and overall methods**

Using a qualitative, cross-sectional, and inductive approach, this study was conducted at two principal layers. The first layer, the degree of sustainability, was investigated based on the two levels of sustainability from the Shediac-Rizkallah model (Shediac-Rizkallah & Bone, 1998): 1) individual health behavior related to malaria and 2) continuation of the PD project activities, accounting the ongoing debate about the definition and the appropriacy of measurement frameworks for sustainability. This model was suitable for the purpose of this research due its flexibility that allows for an open range of possible final outcomes without

imposing an initial bias on what sustainability should mean and how it should be achieved (Sarriot et al, 2004; Shediac-Rizkalla and Bone, 1998). As such, this study has focused on emergent behavior of individuals and of the community, rather than only their degree of adherence to the project activities. In her model, there are three indicators through which sustainability can be said to have been achieved; 1) continuation of project benefits for individuals after initial project funding ends, 2) continuation of project activities within the target community, and 3) building of a community's capacity to develop itself and execute future projects (Sarriot et al., 2004; Walugembe et al., 2019). Secondly, thematic analysis was conducted to identify factors that promote or hinder the continuation of behaviors identified by the first stage. Thematic analysis is one of the widely used qualitative analytic methods which allows researchers to identify and interpret certain patterns (themes) within a data set. (Braun & Clarke, 2006). While other methods, such as grounded theory, share the similar features as seeking themes across data, the biggest difference is that this analysis is not tied to any theoretical framework (Braun & Clarke, 2006). Through its freedom, this method can potentially provide an insight of possible theoretical basis that any PD approach might have.

Regarding approach selection rationale, the inductive approach was chosen based on the exploratory nature of the research question. Two levels of the Shediac-Rizkallah model were applied based on the original purpose of the PD pilot malaria project and the importance of continuing these activities for malaria control and elimination. Correspondingly, the thematic analysis proved effective by previous studies in understanding: the perspective of diverse participants, identifying similarities/differences, and generating unanticipated insights (Braun & Clarke, 2006; Nowell et al., 2017). Therefore, some possible pathways to behavior changes as well as to sustainability can be identified.

## **2. 2. Study site**

Three villages (Kampong Chamlang Leu, Ploav Praim Muy, and Sam Sep) were selected for this study in accordance with their participation in the PD pilot malaria project from August 2010 to March 2011 led by Malaria Consortium, a key partner of the WHO lead Artemisinin Resistance (AR) Containment Project funded by the Bill & Melinda Gates Foundation (BMGF). While more detailed description about this pilot project can be found elsewhere, the target populations had actively participated initially by finding Positive

Deviants – individuals who take atypical but advantageous behavior. Then, they themselves developed plans to spread these behaviors to the rest of the community and implemented the planned activities by the end of the project (Shafique & George, 2014; Shafique, et al., 2016) Despite being required as a first step to the PD approach, malaria was decided to be the problem without community engagement. The PD behaviors carried over from this pilot project were as follows: a) proper usage of mosquito net (cleaning bed to avoid mosquitos inside the net and inserting net's edges into the sheet/mat to avoid mosquito intrusion), b) utilization of insecticide-treated nets or hammocks in farms or forests (including the strategy of mothers and wives packing these for their families to emphasize use), c) covering arms and legs in the evening, d) securing extra mosquito nets for migrant workers by landowners, and e) seeking prompt diagnosis or treatment without delay<sup>5</sup> (Shafique & George, 2014; Shafique et al., 2016).

These villages are located in Sampov Luon (SPL) Operational District (OD), a sub-district of Battambang province in Northwestern Cambodia, which was classified as a Tier 1 area. This designation refers to the highest transmission risk under the AR contaminant project. Furthermore, these villages were selected due to their high mobile and migrant populations (MMP) who are the populations most at risk of infection. At the time of the data collection, there were approximately 2,600 people living in Kampong Chamlang Leu, 2,000 people in Plovav Praim Mui, and 2,500 people in Sam Sep. Deforestation progressed so rapidly that there were seldom any forest goers around these areas. These areas became farms for cassava and corn, which a number of MMPs still visit for seasonal employment opportunities in agriculture especially during the plantation and/or harvest. Majority of the residents of these three villages were farmers with temporal migration during agricultural off season. As these villages are located less than one hour away from the border, a popular destination for temporal migration is Thailand.

In terms of other subsequent elimination efforts, since the completion of the PD pilot malaria project, the U.S. Agency for International Development (USAID) and the President's Malaria Initiative (PMI) have collectively funded three projects under the National Malaria Control Programme (NMCP) at the SPL OD to prevent, control, and eliminate malaria: 1) Control and Prevention of Malaria Project (CAP-Malaria) from 2011 to 2016, 2) Cambodia Malaria Elimination Project (CMEP) from 2016 to 2020, and 3) CMEP2 from 2021-2026

(Kheang, 2014; “Cambodia Malaria Elimination Project” n.d.). These projects have worked with Village Malaria Workers (VMWs), Mobile Malaria Workers (MMWs), Health Centre staff as well as local NGOs that closely work with community and MMPs. Collectively, these groups have assisted in providing early diagnosis, providing appropriate treatment to members of the local communities, improving the quality of surveillance, and facilitating change in behaviors of individuals within these communities. As a result of these activities, no indigenous malaria cases have been reported at SLP OD since 2016, which is officially categorized as an elimination OD, according to the Malaria Elimination Action Framework (MEAF) (2016-2020).

### **2. 3. Sampling methods**

#### **2. 3. 1. Study sample**

Five groups of individuals were selected using purposive sampling; 1) Positive Deviants who exemplified PD behavior(s) and became role models during the project, 2) individuals other than Positive Deviants who participated in dissemination activities including VMWs, Chief and staff of Health Centre, and village chiefs 3) village residents who benefited from or participated in PD activities, 4) village residents who did not do so, and 5) migrant and mobile populations who currently reside with the villages. Amongst these villages, 3 individuals had been identified as Positive Deviants by the pilot project, and all of them were approached. From group 2), one village chief per village, one VMW per village, and one staff per Health Centre were approached. Total 58 individuals from 3) to 5) were selected using stratified sampling to account for gender, ethnicity, and/or SES.

#### **2. 3. 2. Inclusion criteria (for group 3) to 5) only)**

The prospective participants in this study included adult men and women who were A) 18 years old or older; B) were of any ethnic group or religion; C) were able to speak Khmer; and D) were willing to talk about and reflect on their experiences.

#### **2. 3. 3. Exclusion criteria (for group 3) to 5) only)**

People who meet the following criteria were excluded from being prospective participants as above due to possibly incongruous experience relative to the majority, as in: A) those

with difficulties likely to interfere with attendance, such as physical disabilities, and B) those with easier to access medical treatment through working in the medical field or being related to those who do.

#### **2. 3. 4. Recruitment process**

Prospective participants were recruited by word of mouth, based on recommendation from village chiefs and volunteers working at these communities. The recommendation was made based on the geographical distribution in a village to ensure village representation. Research team staff contacted them and briefly explained this study in Khmer. During initial conversation, the staff ensured that each individual met the inclusion criteria. Once when they agreed to participate in the study, the staff arranged times and places for the interviews suitable to the participants.

#### **2. 3. 5. Informed consent**

Only those who agreed to participate and signed informed consent forms prior to the interview joined. The forms included: voluntary participation in the study, the potential benefits, any harm from participation in the study, and the right to withdraw from the study anytime during the interview/discussion without penalty. The research team staff read and gave the potential participants an informed consent form to obtain their agreement to participate. The staff also asked the participants to sign or otherwise authorize the consent form.

#### **2. 3. 6. Withdrawal of participants from study**

Each participant had the right to withdraw from the study at any time. In addition, the research team member may remove a participant from the study at any time if necessary for any reason including: 1) ineligibility (either arising during the study or retrospectively having been overlooked at screening), 2) significant non-compliance with study requirements, and 3) withdrawal of Consent. Furthermore, all participants were provided the opportunity to modify or redact their contribution(s) regardless of degree or completeness of participation, and to date, no one has withdrawn.



#### **2. 4. Data collection procedures**

Experienced qualitative interviewers and facilitators conducted Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) with the above mentioned participants; they had no previous contact with the target villages or the pilot project enabling them to conduct KIIs and FGDs from a neutral standpoint. KII is the most suitable to understand in-depth the subjective perceptions of the individual participants. Thus, taking into consideration the level of commitment of the PD pilot malaria project and the level of understanding of the community (including its members' behaviors in terms of prevention and treatment seeking), KII was conducted with groups 1) and 2). Specifically, the interviewer used a semi-structured interview guide to shed light on their experiences after the pilot project, as well as their attitudes towards the methods and results of the project. The main topics of discussion for the KIIs and FGDs with groups 3) to 4) were: A) current status of any PD activities within the community, B) other community activities related to health/well-being, C) community members' current preventive and health-seeking behaviors, and D) reasons for (dis)continuation of the PD activities. Finally, in addition to the KIIs and FGDs, further FGDs were conducted with MMP to ascertain current malaria prevention behaviors and any other impact the project may affect. In total, 10 KIIs and nine FGDs with six to eight participants each were conducted.

Regarding training the data collectors themselves, the interview and observation study were conducted by staff with experience in qualitative methods who also completed a refresh training course for interview techniques, moderation skills, note taking skills, data collection as well as handling methods, informed consent and knowledge of research ethics. During the training, the interview guides were pre-tested at the villages before the interviews began to ensure the participants' understanding of language and concepts. After the pre-test, the interview guides were modified. The data collected through the pre-test was not included in the data analysis results<sup>6</sup>.

For recording the data itself, the interview and observation studies were audio-recorded by tape and transcribed verbatim within a few days to reduce recall bias. These transcriptions were translated into English after completion of the interviews. Then, the research team coded the transcript to reveal broad or initial categories and themes. Immediately afterward, field notes were recorded to include the interviewer's reflections on

the interview, the participants' non-verbal behaviors, and any emergent themes.

## **2. 5. Data analysis**

The data was triangulated with other transcripts of the KIIs and FGDs as well as field notes. Thematic analysis was conducted as following order; familiarizing the data and drafting an initial theme framework by the primary author, then reviewing the constructed theme framework and interpreting the findings into the phenomenon in the participants' context by the research team (Gale et al., 2013; Nowell et al., 2017). Adjustments to themes and ideas were made during the reviewing and interpreting process (Braun & Clarke, 2006).

The study utilized NVivo 12 software to accurately, time-effectively analyze the data. NVivo software makes sections of text and categorizes organized by text segment into concepts, as well as examines connections among the data to show how one concept may influence the other. These findings were reported following the Consolidated Criteria for Reporting Qualitative Research (COREQ) to ensure the transparency of this study (Tong, Sanibury, & Craig, 2007). This guideline has been the most commonly used reporting guidelines for qualitative studies, effective in improving reporting quality (de Jong, et al., 2021; Walsh, et al., 2020).

## **2. 6. Ethical and regulatory considerations**

The protocol, informed consent form, and interview guides were submitted to the appropriate Research Ethics Committee (REC)<sup>7</sup> and host institution(s) for written approval. The investigator submitted and, where necessary, obtained approval from the above parties for all substantial amendments to the original approved documents.

## **3. Results**

### **3. 1. Demographics**

The demographics are provided for the participants of FGDs. Across all groups, the age range of women was 18- 64 years and of men was 27- 63 years. Majority were in their 30s. The group of non-participants were somewhat older. Each group had a similar educational background of which the majority group had a primary level of education with a tendency of females being less educated. (Table 1). In terms of occupation, all groups, even non-MMPs,

predominantly engaged in farming with temporal migration to other cities both inside and outside of Cambodia and/or work in the forest.

**Table 1 Demographic characteristics of participants of the FGDs**

	Participant of pilot Project		Non-Participant		MMPs	
	Male N=2	Female N=18	Male N=5	Female N=14	Male N=10	Female N=9
<b>Age Range</b>						
in years	27-30	21-49	32-64	29-62	27-36	18-33
breakdown						
18-29	50%	33%	0%	7%	50%	67%
30-39	50%	56%	40%	43%	50%	33%
40-49	0%	11%	20%	7%	0%	0%
50-59	0%	0%	20%	36%	0%	0%
60-69	0%	0%	20%	7%	0%	0%
Median	28.5	31	46	43.5	29.5	28
<b>Education</b>						
Primary	50%	50%	40%	50%	50%	67%
Secondary	50%	28%	60%	21%	40%	11%
None	0%	22%	0%	29%	10%	22%

Total number: 39 for village residents and 19 for MMPs.

### 3. 2. Characteristics of participants in the PD pilot malaria project

The participants of the pilot project joined due to recognition of malaria as a financial risk, causing not only the loss of working opportunity due to the sick leave but also treatment expenses. Following comments were shared as reasons of their participation of the pilot project;

*“To protect not to have any disease, our good health. That way it doesn’t waste our time.”*  
FGD-male villager (participant of the PD pilot malaria project)

*“Can say that my child never gets sick and no need to spend on the [treatment] serum.”*  
KII- male village chiefs

### 3. 3. Characteristics of non-participants in the PD pilot malaria project

From the interviews, the following three reasons were frequently mentioned as reasons for not participating in the pilot project: 1) being absent from the villages due to work, 2) having no transportation and/or underdeveloped roads, and 3) having insufficient literacy to

understand what was about.

*“Because we never stay home” FGD- male villager (non-participant of the PD pilot malaria project)*

*“Walk on the road is hard too, we have to walk cross the forest.” FGD- female villager (non-participant of the PD pilot malaria project)*

*“They put picture, but we didn’t know alphabets, so we cannot read... I didn’t attend because I don’t know how to read alphabets.” FGD- female villager (non-participant of the PD pilot malaria project)*

### 3. 4. Sustainability

#### 3. 4. 1. Preventive behaviors

Although there have been no reported indigenous malaria cases in the target villages since 2016, all of the study participants including MMPs answered that they have kept taking preventive behaviors. Table 2 shows the normative preventive behaviors that they mentioned to be practiced. As shown in this table, all of the PD behaviors related to individual levels of malaria prevention were still widely practiced.

**Table 2 Normative preventive behaviors**

Behaviors identified as PD	Other behaviors a
<ul style="list-style-type: none"> <li>● Use long lasting insecticide mosquito nets correctly (e.g. inserting net edge into the matless/sheet, cleaning house before go to bed) when sleeping</li> <li>● Cover arms and legs during evening and in the forest</li> <li>● Bring and use long lasting insecticide mosquito net and/or hammock to farm and forest</li> </ul>	<ul style="list-style-type: none"> <li>● Burn mosquito coils or bonfire</li> <li>● Clean surrounding environment not to have a place where mosquito larva can grow such as puddle, tire, or coconut shell</li> <li>● Use mosquito spray or repellent</li> </ul>

<sup>a</sup> These behaviors were also promoted through NMCP during the pilot project. However, due to its replicability, the degree of promotion for some of these behaviors were less compared to the behaviors identified as PD.

It is worth noting that none of the study participants recognized these PD behaviors as

unique to the community. This is also supported by comments from one of Positive Deviants that she believed her selection as a Positive Deviant was due to answering correctly rather than a result of uniqueness or deviancy of these behaviors. This lack of recognition by community members is because these behaviors were aligned with the NMCP and similar messages have been delivered before and after the pilot project.

*“He (organizer) said, if I answered right, he would choose me as a model... and I got the right answers, then he took me as a model person.” KII- female Positive Deviant*

### **3. 4. 2. Factors**

#### **3. 4. 2. 1. Factors common to all groups.**

Reasons for continuously taking these behaviors common amongst all groups are not only to prevent malaria but also to avoid troubles including financial risk or annoyance related to mosquitoes.

*“Afraid of children becoming sick, what money do we have to cure the disease.” FGD-female villager (participant of the PD pilot project)*

*“It is good for ourselves; protecting us from spending a lot of money and waste time too.” FGD-male villager (participant of the PD pilot project)*

*“If we don't tie the mosquito net, the mosquito bite, how can we sleep?” FGD-male villager (non-participant of the PD pilot project)*

*“They sound ‘hevvvvvvvvvvvv,’ bite us and we cannot sleep.” FGD-female villager (participant of the PD pilot project)*

Although they mentioned that hanging mosquito net every night was somewhat bothersome and/or insecticide treated net causes skin irritation, they kept using mosquito net because they acknowledged the demerit of not using it. In addition, some mentioned applicability to other diseases such as dengue fever.

#### **3. 4. 2. 2. Factors specific to PD pilot project participants.**

For those who participated in the PD pilot project, gaining knowledge and skills about

preventive behaviors as well as understanding its effectiveness through continued information sharing by the subsequent projects were other factors that encouraged sustainability. In fact, when interviewed, many study participants confused the PD pilot project with other malaria projects as indicated by their explanation of the pilot project including non-project-relevant activities, such as cleaning their surroundings to prevent larval mosquito growth, which now becomes one of their typical preventive behaviors as shown in Table 2. Moreover, one factor widely acknowledged by community members for leading to the continuation of these behaviors was the frequent reinforcement from VMWs representing subsequent projects.

*“They afraid that we forget, so they just try to recall us.” FGD-female villager (participant of the PD pilot project)*

*“The reason is we keep educating them.” KII-female VMW*

### **3. 4. 3. Treatment behaviors**

The behaviors had been normative treatment-seeking behaviors before the PD pilot project, such as taking medicine first and waiting for a few days before going to a health facility. Though, rather than waiting, a majority of the study participants reported that they immediately go to the Health Centre or VMWs to receive blood tests for diagnosis when malaria-like symptoms appear. In fact, the number of tests provided in the CMEP catchment area increased from 3,688 in 2017 to 63,372 in 2021 (United States Agency for International Development, 2022).

### **3. 4. 4. Factors**

#### **3. 4. 4. 1. Factors common to all groups.**

One factor was the increase in access of the diagnosis test which had been actively supports by subsequent projects through implementing 1-3-7<sup>8</sup> approach (Kheang, 2020; United States Agency for International Development, 2022). However, the study results also indicated that the recognition of being sick as a risk and of benefits of taking a proper treatment behavior contributed to this behavior change.

*“They get result such as they are not sick, so they can go to work, doing business, as said*

*no sickness, they can save some money and have more time to reduce poverty.” KII-male village chiefs*

*“Nobody forces us. We afraid of being sick.” FGD- female villager (non-participant of the PD pilot project)*

### **3. 4. 5. Project activities**

The following activities had stopped in all three target villages by the time of the data collection: PD information sessions and regular meetings at the Health Centre with Positive Deviants. The most frequently answered reason for stopping these activities was the malaria case reduction. Although those PD project activities have been stopped, other activities, including information sharing about malaria among community members and mosquito nets reservation for MMPs by landowners, have continued.

### **3. 4. 6. Factors**

Most of the participants who continued these activities were the core members of the pilot project, such as Positive Deviants, village chiefs, and VMWs. Amongst them, village chiefs and VMWs have been in a position responsible for being active in any malaria related activities happening in their communities. As subsequent projects also had education sessions and information sharing with mosquito net distribution, these projects have highly influenced the continuation of their activities. In fact, one VMW answered that she continued these activities because of a sense of responsibility to the currently implemented project.

*“Me, it is about my responsibility. I must come down (to the villages) at least once a month to meet them. So, I will not miss because my report must release every month”  
KII- female VMW*

For those Positive Deviants, two out of three Deviants continued to share information with community members. Both of them were males over 60 known to commune teams and be active in community activities. When asked the reasons for participating in community activities, they mentioned a sense of self-worth contributed to this.

*“I feel happy that I can help others with the training courses. And let people in my*

*community got more understand about it.” KII-male Positive Deviant*

## **4. Discussion**

### **4. 1 . Process of change**

Villagers experienced a process of behavior change, accounted for by the Health Belief Model (HBM)<sup>9</sup> (Rosenstock, 1966; Rosenstock, et al., 1988; LaMorte, 2022), where perceptions of malaria-related negative outcomes prompted self-efficacious behaviors. Before attending this argument in detail, it is necessary to first contextualize the results thus far. PD behaviors related to prevention and treatment of malaria have been widely practiced by individual members of the target communities, and some of PD pilot activities have been continued by core members even 10 years after its completion. By comparing the similarities and differences of participants and non-participants of the PD pilot malaria project, following three factors were suggested as main contributors for continuations: 1) recognition of being sick including malaria as a risk, 2) recognition of wide range of benefits of taking these behaviors not only to malaria but also to other mosquito related problems, and 3) continued education with consistent messages from the consistently attending members. According to a project member, among these three factors, the first two factors were purposefully delivered by the PD pilot project to enhance intrinsic motivation. In addition, the project team intentionally utilized the existing village structures, such as village chief and VMW, as well as the concept of NMCP to not only sustain the benefits and activities of the pilot project but also expand these to non-participants even after its completion.

Based on the above factors in line with the project’s intended strategies, a process of behavior change similar to HBM was found to be experienced by villagers. Through the pilot project, villagers who lived within a high malaria transmission risk area (perceived susceptibility) understood the adverse effects of contracting malaria (perceived severity) and recognized the benefit of taking preventive and proper treatment behaviors, such as enabling them to reduce the risks (perceived benefit) with less demerit to them (perceived barriers). With the support of subsequent projects with the consistent messages delivered by the consistently attending members (cue to action), participants have continued; moreover, non-participants had opportunities to start taking these behaviors, recognizing their own self-efficacy through their success combating malaria in their community (self-



efficacy).

As a core principle of the PD approach being “strength based,” research to-date has posited positive reinforcement as a main motivator for behavior change (Baxter & Lawton, 2022; Marsh et al., 2004; Pascal et al., 2010). For instance, the Social Learning Theory has been employed in analysis, as this theory proposes that human behavior can not only be learned by direct experience but also by observation and imitation of others’ successful, strength-demonstrating behaviors, leading to confidence in their ability to perform these positive behaviors (Bullen, 2012; Tadayon Nabavi & Bijandi, 2021). Despite the typical focus on the positive factors as core principle, this study investigated the influence of the negative reinforcement on behavior change. Thus, in contrast with other strength-based analysis of PD projects, this study was able to identify how risk- and fear-based polarities of motivation, per HBM, was able to effectively complement sustainability for behavior change over time.

#### **4. 2. Relationship between the uniqueness of behavior to be adopted and sustainability**

Many cases defined the uniqueness of a behavior itself as a key element to promote the sense of ownership required for sustainability (Pascale, et al., 2010). However, the results have suggested that, even if a behavior is already well-known, as is the case with established vector control such as malaria, uniqueness can still arise in the form of its implementation strategy as demonstrated by community members as above. In fact, the promoted preventive and treatment seeking behaviors had been recommended universally, lowering any possible uniqueness perceivable by the target communities (WHO, 2022). Rather, Positive Deviants who took these behaviors were chosen based on the fact that the majority of community members did not take these behaviors even though they knew its importance (Shafique & George, 2014; Shafique et al., 2016). Therefore, while previous research has primarily focused on the uniqueness of the behavior targeted by the PD approach, one predominating finding was how the characteristic uniqueness for this case was revealed to be the implementation strategy of the behavior, rather than the behavior itself, that drove sustainability. This finding may add a significant value to future PD- related studies, by clarifying the different interdependent relationships between sustainability and the definitions of PD chosen for its project.

In summary, the community members of the PD pilot project have experienced a HBM-

like process of change over 10 years after its completion. This was purposefully delivered by the project with the strategies of enhancing intrinsic motivation as well as utilizing already existing structure. This means that the same process of behavior change could not be guaranteed by PD approach without taking the above mentioned strategies and would not be reliably result from only PD approach. Moreover, the uniqueness of the behavior to be adopted is not the only requirement for their behavior change and sustainability.

#### **4. 3. Limitations and challenges**

One limitation is the impossibility to identify PD specific effects. This is a retrospective study analyzing one case which accompanies several limitations such as recall bias and inability to identify confounding factors, as such it is not possible to determine whether the effects identified by this study was solely due to the PD approach or other approaches could have produced similar effects (Talari & Goyal, 2020). Future studies to compare the effectiveness of other approaches versus those of PD approach would be beneficial to identify PD specific effects. Another limitation is the applicability of the findings. In order to increase its applicability, other case studies of similar context would be beneficial. In addition, as mentioned previously, numerous variations of the PD approach have been implemented in practical settings (Baxter & Lawton, 2022; Bullen, 2012). Therefore, similar case studies to different variations are required to identify a common pathway evolved through the PD approach if any and/or to categorize them to find a best suitable style of which the PD approach can be most effective.

#### **4. 4. Future application**

According to knowledge to-date, this is a first attempt to investigate how the PD approach works in a context of malaria prevention during control and elimination stage in a time span of a decade. Although there are some limitations in terms of applicability and more cases need analysis, the findings from this study can be applied to similar situations of uneven adoption of community engagement and well-known solutions in a country or region where continuous commitment is promised for a certain period of time. Three distinctive characteristics of the pilot project are as follows: 1) the first step of PD, defining the problem, was decided without community engagement, 2) the solutions identified are not

exceptionally deviant and relatively common to public health settings that were not yet uniformly adopted, and 3) the continuous efforts by host country with consistent messages exist from control to the elimination stage. These situations are surprisingly not rare and thus future application of the study findings would be expected. For those cases, taking the strategies utilized by the pilot project that promote HBM-like process of change in the target population is recommended to enhance the project sustainability and long-term effects. These strategies are; delivering messages that allow acknowledgement of the decreased risk or of the merit of changing behaviors, and leveraging existing structures that enhance the cues to action to prevent relapse and expand beneficiaries. The future applicability of this method demonstrates that, in one form or another, the PD approach has many elements applicable to create lasting, sustainable change.

## Notes

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- 5 In the PD pilot malaria project, not only the behavior itself, such as using insecticide-treated mosquito nets while sleeping, but also strategies of how to take these behaviors, such as inserting net's edges into sheet, were identified as deviant strategies and spread these to the rest of the community.
- 6 Amongst researchers, the community mobilization specialist had engaged in the target pilot project and was known by some of the community members. During data collection, he only presented in pre-test in order not to influence the interview results by his presence.
- 7 This study was approved by the Research Ethics Committee, Graduate School of Medicine of the University of Tokyo and the National Ethics Committee for Health Research in Cambodia in 2019.
- 8 1-3-7 approach is a surveillance and response model which involves reporting of confirmed malaria cases within one day, investigation of malaria cases confirmed through rapid diagnostic testing (RDT) within three days, and application of response activities to prevent further transmission within seven days. This model was piloted in SPL OD via CAP-Malaria and developed through CMEP.
- 9 Health Belief Model is a model developed in public health to explain and predict individual change in health behavior. The model originally defines four key factors that influence one's health behaviors as an individual's 1) perceived risk of acquiring sickness or disease (perceived susceptibility), 2) belief of serious consequence (perceived severity), 3) potential positive benefits of action (perceived benefits), and 4) perceived obstacles to performing a recommended action. As the research of HBM evolved, two components have been added: 5) exposure to factors that stimulate to take action (cues to action), and 6) confidence in ability to succeed (self-efficacy).

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