**Cambodia Research and Evaluation Report**

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# Executive Summary

This research and evaluation report was commissioned to explore ways and means by which the potential impact of health camps in Cambodia might be tracked and measured on the ground. Blood pressure data was collected from five villages, under BMZ POL011, over a 10 month period for a total of 709 unique cases. The objective of the study was to analyse and understand the dataset to determine impact on the control of blood pressure, and to analysis and determine what the data reveals about the levels of programme delivery consistency, both collectively, as well as in terms of potential village to village variances. This was achieved through two integrated components of a quantitative evaluation of the POL011 dataset and qualitative research to understand the results from the quantitative assessment.

The criteria for diagnosis of hypertension used are: systolic blood pressure (SBP) of ≥140 mm Hg and/or diastolic blood pressure (DBP) of ≥90 mm Hg as per World Health Organisation’s (WHO) guidelines. For hypotension, the criteria used for diagnosis were SBP of ≤90 mm Hg and DBP of ≤60 mm Hg.

**Data Entry**

With respect to the data, several issues were found from cleaning the data. First, inconsistent data entry led to differences in presentation of results; for example the use of both short and long hand that often led to auto-correction of data values by excel. Second, the need to code BP data into two variables: (I) systolic; and (II) diastolic. This will improve analytical processes. Third, ensure data for both BP levels are entered; four cases were found without a corresponding diastolic level. Fourth, it is important not to conflate string (text) and numeric data within a variable. It is recommended that if no BP data was recorded to leave the value blank.

**Attendance**

A total of 709 unique participants attended the health camps on 1,232 occasions across the five communities during the reference period giving an attendance rate of 24 per cent. With the number of unique individuals greater than the number of OPA members in each community (575 members) this suggests non-OPA members also attend. Nonetheless, the evidence suggests that despite this, only approximately one quarter to one third of OPA members attended the health camps during the reference period.

Older persons comprised approximately two thirds of those attending the health camps, with less than 40 per cent attending the heath camps on two or more occasions. Significant variation was found between the villages, with less than a fifth of older persons in Bak Amarek and less than one third in Rumchey attending two or more health camps, whilst approximately two thirds of older people in Chak Touch and Prean Nil attended two or more. These findings indicate significant levels of deterrence from health camp attendance in some villages.

Attendance is affected by simultaneous demand and supply factors. From the demand perspective, many people expressed they did not attend due to them being occupied by their livelihood activities; too sick, were looking after family members; or even were not aware the health camp was being conducted. Similarly, many did not join or return as they felt healthy or did not think the health camp was wholly relevant for them. The proximity of the heath camp to OPA member’s homes was cited a significant benefit with nearly three quarters of those surveyed living within 500m of the health camp.

**Blood Pressure Recording**

A total of 678 blood pressure cases were recorded over the reference period, with 441 (62 per cent of the sample) unique individuals. This gives an average screening rate of 53 per cent at the health camps suggesting a significant gap in screening levels. This was particularly significant in Rumchey, where only 1 in 10 persons were screened. This translates to only five per cent of the sample screened in the four or more periods anticipated by the project design. Nearly two thirds of the individuals screened had their BP recorded only once. Hence, there are relatively few unique cases from which the impact of the heath camp can be measured over.

A total of 353 cases of uncontrolled blood pressure were recorded giving a prevalence rate of 50.2 per cent; of which 162 (23.9 per cent) were hypertensive and 192 (28.3 per cent) were hypotensive. This indicates hypotension is a more significant issue than hypertension in these villages. Some villages recorded significantly high levels of uncontrolled blood pressure suggesting purposive targeting leading to bias in the prevalence rates in some communities. The analysis used the prevalence rate and the number of older persons not screened to predict the number of hypertensive and hypotensive older people not picked up. A total of 202 older people were not picked up: 100 older people with hypertension and 102 with hypotension.

Similar to attendance, blood pressure screening is determined by demand and supply driven barriers. A principal constraint identified was that blood pressure was checked only for those who wanted it checked. This is accompanied by a significant simultaneous supply side constraint with blood pressure sometimes checked at the health camp but not recorded if it is normal. Further barriers identified included health camp waiting time leading many to return home, long educational componentslead to little time for checking blood pressure,rain leads many to go home early, and insufficient medicine and human resources.

Impact Measures

The analysis on attendance and BP screening lays the foundation for undertaking impact analysis. Several issues exist with undertaking robust impact analysis. First, the low frequency of unique cases re-attending health camps leads to significant variation in who is present at each health camp. Second, little follow-up with blood pressure screening limits tracking individuals over time. Third, there is an absence of baseline data from which changes in blood pressure can be compared. Indeed, at least three quarters of respondents from the household surveys had attended health camps prior to the reference period.

Little evidence was found in changes of mean SBP whilst there was a significant fall in mean DBP. This in itself goes some way to explain the issue of hypotension in these communities. Using the mean, standard deviation analysis found the distribution of the data narrowed suggesting uniformity in the data over the health camps.

Transitional probability analysis finds stabilisation in the incidence of hypertension over the reference period, but still remains prevalent. By contrast, the incidence and prevalence of hypotension was found high.This confirms the increasing important of addressing hypotension in these villages with increasing levels of absolute and relative people becoming hypotensive or remaining hypotensive. Demographic analysis indicates a low incidence but a high prevalence of hypertension whilst there is a high incidence and prevalence of hypotension. This is consistent with the grouped analysis.

**Recommendations**

* **Need to consolidate and build existing data and practices over expansion. The inclusion of a few additional variables could strengthen the dataset but it is imperative to not over complicate and keep things simple. This will ensure accurate and robust data collection.**

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# Introduction

This research and evaluation report was commissioned to explore ways and means by which the potential impact of health camps in Cambodia might be tracked and measured on the ground. These health camps have been collecting blood pressure data deriving from screening completed at health camps under the BMZ POL011 project. This has resulted in 10 months worth of data tracking both health camp screening activities for blood pressure, as well as 709 individual case histories, of which a significant proportion were considered to have uncontrolled blood pressure, specifically through hypertension.

The objectives of the research and evaluation are as follows:

1. To analyse the BMZ POL011 dataset to determine the impact of health camp work in Cambodia on the awareness of hypertension.
2. To analyse the impact of the health camps on control of hypertension.
3. To analyse and determine what the data reveals about the levels of programme delivery consistency, both collectively, as well as in terms of potential village to village variances.
4. To understand the qualitatively factors, as informed by the statistical analyses, that affect control, awareness, as well as the quality of screening and treatments for hypertension.

The report is broadly divided into three sections. The first section identifies attendance levels and what...

**Include discussion of separate study and baseline report.**

### Methodology

This research consists of two integrated components: (I) quantitative; and (II) qualitative. The former uses primary data collected from five community health camps between March and December 2012. The latter complements the quantitative analysis through undertaking qualitative fieldwork to analysis the determinants of the quantitative results. In this sense, we want to understand the key drivers to these results and map recommendations for the health camps.

Three communities were purposively chosen for the qualitative analysis:

1. **Chak Touch** (Moung Ruessei district)
2. **Preaek Norint** (Aek Phnum district)
3. **Ramchey** (Banan district)

These communities provide representative case studies based on the quantitative analysis in terms of health camp attendance and screening. Chak Touch provides a community with regular health camps and an improving screening rate; Preaek Norint provides a community with consistent attendance and screening rates; and Rumchey provides a community with poor screening recording.

Three instruments were used for the qualitative component: (I) household surveys; (II) focus group discussions; and (III) semi-structured key informant interviews. The data was collected during March 2013.

Household surveys were used to understand the dynamics that surrounded attendance, education and screening at the health camps. The instrument followed a consistent framework and focused on: (I) Education and Knowledge; (II) Attendance; (III) Barriers and Constraints; and (IV) Health Camp Services. Households were strategically sampled from the dataset to provide a representative overview of households attending one health camp, re-attending health camps, screened just once, screened several times, with hypertension, and with hypotension. A total of 67 households were selected from the chosen communities.

Focus group discussions were used to generate dialogue and explore issues in more depth from the health camps. Discussions followed a generally consistent format with minor changes to reflect the nuances from the quantitative analysis in term of attendance and screening. The instrument was used primarily to understand the health groups for the OPA as a group and included: health camp education, barriers and constraints, successes, attendance, screening, and opinions on the health camps themselves. Two groups were held in each community and consisted of 6-12 people.

Semi-structured interviews were incorporated to understand the perspective of the supply side. This consisted of interviews with health camp staff to give their opinion on the health camps. The structure was generally consistent with minor changes to reflect the nuances from the quantitative analysis. These interviews were only possible in Chak Touch and Preaek Norint due to the tight time schedule.

### Background Information

For the purpose of this evaluation, the criteria for diagnosis of hypertension were systolic blood pressure (SBP) of ≥140 mm Hg and/or diastolic blood pressure (DBP) of ≥90 mm Hg as per World Health Organisation’s (WHO) guidelines.[[1]](#footnote-1) These guidelines are used in Cambodia to diagnose hypertension, with the pre-hypertensive state initiating at SBP of ≥120 mm Hg and DBP of ≥80 mm Hg.[[2]](#footnote-2) The criteria used for diagnosis of hypotension were SBP of ≤90 mm Hg and DBP of ≤60 mm Hg. All readings in the health camps were taken using an analogue (Mercury Sphygmomanometer) with the patient lying down on a mat.

The health camps are generally conducted every two months in selected villages in the Batdambang province, Cambodia. This is more regular than standard blood pressure reading guidelines as outlined by the Ministry of Health in Cambodia of every six months. During these sessions, medical assistants from Community Health Centres travel to villages to teach OPA members about hygiene and health maintenance, distribute basic medicines, and perform routine health checks. This notably includes the screening of blood pressure for the diagnosis of hypertension.

The educational component includes 9 topics: Hypertension; Tuberculosis; Cataract; Rheumatoid Arthritis; Stroke or Cerebral Vascular Accident; Diabetes Mellitus; Mental health; Dental Hygiene; and Older People and Prevention. These topics are typically rotated, with each health camps adopting 2-3 for the education component. **It is important to note that this report did not obtain information for when each rotation was conducted in a given community. As such, attendance levels could be determined by this as well as blood pressure readings, particularly when the topic is hypertension.** In addition, those attending health camps receive a small amount of paracetamol and vitamin C.

### Data Entry

With respect to the data, there are several issues that result from data entry itself. First, there is a need for consistent data entry and avoid differences in how the data is entered. For example, avoid using short hand terms such as 14/8 and use the full 140/80 to give consistency in the data. This will also remove the auto-correction of data values by excel into a date format. Second, the BP data needs to be coded into two separate variables to allow analysis for both blood pressure levels. When entered as one value there are severe limitations set for analytic processes. Third, ensure there are both systolic and diastolic levels entered. Four cases were found without a corresponding diastolic level.

One restriction in using an analogue reader is that results are round to the nearest 10 units; for example 136 becomes 140 and 134 becomes 130. As such, there could be a significant deviation from the true reading. This has significant implications for those on the fringe of hypertension and hypotension who may be in a pre-hypertensive state (e.g. 130’s) rather than stage 1 hypertension (e.g. 140).

Finally, it is important note to conflate string (i.e. text) and numeric data within a variable. It would be more useful for example if blood pressure was not checked to have the entry left blank. In all entries, the string response “No” has been included if blood pressure was not checked even if the individual had not attended a health camp. Thus, to avoid errors it’s best the field is left blank.

# Section II: Health Camp Attendance

## II.I: Health Camp Participation

Analysis on health camp attendance allows us to illustrate the numbers of people attending the respective health camps, and to understand when the health camps are coordinated and how attendance levels vary. Prior to examining the respective health camps, it is important to present a breakdown the frequency of participants attending the health camps by community as presented in Table 1. We can see a total of 709 unique participants attended the health camp between March and December 2012. Rumchey has the largest proportion with over one third of attendees, with Prean Nil the smallest proportion.

Table 1: Number of participants attending heath camps, by community

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Village** | **Freq** | **%** | **OPA Members** | **% OPA Attending** |
| Bak Amraek | 174 | 24.54 | 133 | 130.83 |
| Chak Touch | 145 | 20.45 | 94 | 154.26 |
| Preaek Norint | 81 | 11.42 | 108 | 75.00 |
| Prean Nil | 54 | 7.62 | 85 | 63.53 |
| Rumchey | 255 | 35.97 | 155 | 164.52 |
| **Total** | **709** | **100** | **575** | **123.30** |

Table 1 also tells us the number of OPA members in each respective community. Similarly we can see Rumchey has the largest number of OPA members and Prean Nil has the smallest. From these figures, we can determine the proportion of the OPA that attends the health camp. We can see over that the number of people attending a health camp is greater than the number of OPA members overall suggesting non-OPA members are attending the health camps as well. It is important to note that we do not know whether the whole OPA has attended, but we can establish that non-OPA members do attend.

In Rumchey this equated to 164 per cent of the OPA size. By contrast, in Preaek Norint and Prean Nil we can see that not all OPA members attended a health camp. Figure 1 tells us that over three quarters of health camp attendance is by women, giving a 3:1 gender ratio.

Figure 1: Gender distribution of those attending health camps

Next, we disaggregate the number of health camp attendees by community and period. This is presented in Table 2. It is important to note that these are absolute numbers attending and does not tell us whether these are the same individuals. This will be addressed in the next section.

**A total of 1,232 people attended health camps across the communities during the reference period.** Chak Touch had the highest total number of attendees followed by Rumchey with Prean Nil the smallest number. We can also see that May and August have the highest number of attendees followed by March and October. These figures are derived from health camps being held in all five communities during these periods.

Interms of health camps being coordinated we can see thathealth camps have been conducted in Chak Touch and Rumchey in all periodswhich accounts for the highest participants.In Bak Amraek, Preaek Norint, and Prean Nil, health camps were conducted in four periodsduring the reference period. Taking average attendance, we can see that Bak Amraek has the highest average attendance followed by Chak Touch with Prean Nil having the lowest average attendance. We can see attendance levels remain fairly homogenous with the occasional fluctuation; for example August in Preaek Norint or March for Rumchey. Hence,we can conclude that health camp attendances have fairly consistent levels of representation.This is significant for the next section when we address whether these individuals are invariable.

Table 2: Number of beneficiaries attending the health camps, by community and period

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mar** | **Apr** | **May** | **June** | **July** | **Aug** | **Sept** | **Oct** | **Nov** | **Dec** | **Av.** | **Total** |
| Bak Amraek | 56 | 0 | 63 | 0 | 0 | 53 | 0 | 33 | 0 | 0 | 51 | **205** |
| Chak Touch | 34 | 37 | 46 | 34 | 42 | 40 | 37 | 44 | 45 | 47 | 41 | **406** |
| Preaek Norint | 23 | 0 | 35 | 0 | 0 | 53 | 0 | 29 | 0 | 0 | 35 | **140** |
| Prean Nil | 24 | 0 | 33 | 0 | 0 | 30 | 0 | 25 | 0 | 0 | 28 | **112** |
| Rumchey | 53 | 31 | 31 | 39 | 39 | 32 | 31 | 40 | 39 | 34 | 37 | **369** |
| **Total** | **190** | **68** | **208** | **73** | **81** | **208** | **68** | **171** | **84** | **81** | **123** | **1232** |

Using the figures from Table 1 & 2 we can determine the number of OPA members that are attending each health camp. We have already seen that there are non-OPA members attending which makes the analysis difficult as we do not know the respective number of OPA and non-OPA members attending. However, even if we assume all members are attending the average attendance in each community ranges from 24 per cent in Rumchey to 44 per cent in Chak Touch. As such these figures are likely to be lower if we include non-OPA members. **Hence, the majority of OPA members do not attend the heath camps.**

We can gauge the attrition rate of health camp attendance by taking the sum of the number of unique individuals that have attended a health camp and multiply it by the number of health camps conducted in a given community. This gives a potential attendance rate of 5,236. With total attendance during this period for these health camps at 1,232, this translates to **an attendance rate of just 23.5 per cent.** This is significant in that many individuals do not attend all the health camps. This will be further explored in the next sub-section.

### II.I.II: Home Visits

The health camps incorporated home visits and are presented in Table 3 below. We can clearly see a low frequency of home visits, with none conducted in Bak Amraek and Preaek Norint. The majority were conducted in Chak Touch and Rumchey and remained consistent across the reference period.

Table 3: Cases receiving home visits, by community and period

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mar** | **Apr** | **May** | **June** | **July** | **Aug** | **Sept** | **Oct** | **Nov** | **Dec** | **Total** |
| Bak Amraek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Chak Touch | 0 | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | **17** |
| Preaek Norint | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Prean Nil | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | **5** |
| Rumchey | 1 | 3 | 5 | 3 | 5 | 5 | 4 | 2 | 3 | 2 | **33** |
| **Total** | **1** | **4** | **5** | **5** | **7** | **10** | **6** | **6** | **5** | **6** | **55** |

## II.II: Participation Pattern Analysis for Attendance

The previous analysis demonstrates the number of participants at health camps. However, so far we have not addressed whether or not these are the same people, and more specifically, the frequency a given person is attending. As previously discussed, there are a total of 709 unique cases in the dataset across 10 periods.

We use participatory pattern analysis to uniquely identify the distribution of those attending health camps, and more specifically, to understand the frequency participants are attending. The average distribution of attendance is approximately 1.74 periods. The distribution (T*i*) shows that over 50 per cent attended only once, with 25 per cent attending two or more periods, and 5 per cent attended on 5 or more periods. Using the previous analysis of the frequency the health camps were run, this demonstrates **a small proportion of individuals attending all of the health camps in their respective communities.**

Table 4 below presents the participatory pattern analysis for the first 10 patterns for those attending the health camp at the sample level. We can see that these patterns account for 488 people (68.83 per cent) of those ever attending. We can see the highest frequency of unique participants is found for single periods in March, followed by May, August, October and December; all of which conducted health camps in all five communities. **This suggests a notably high attrition rate for health camp attendance, with the majority of people coming once and not returning.** From these 488 people, 48 (9.8 per cent) attended on two occasions. **From an educational perspective, with a rotating curriculum system, there are many that only receive partial health camp education.** It is important to note that this figure is likely to be higher in the unaccounted patterns, but what is significant is the low frequency of re-attending health camps.

Table 4: Participatory Pattern Analysis for Attendance (Sample)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pattern** | **Frequency** | **Percent** | **Cumulative** | **Pattern** |
| M | A | M | J | J | A | S | O | N | D |
| **1** | 96 | 13.54 | 13.54 | X |  |  |  |  |  |  |  |  |  |
| **2** | 88 | 12.41 | 25.95 |  |  | X |  |  |  |  |  |  |  |
| **3** | 69 | 9.73 | 35.68 |  |  |  |  |  | X |  |  |  |  |
| **4** | 66 | 9.31 | 44.99 |  |  |  |  |  |  |  | X |  |  |
| **5** | 39 | 5.5 | 50.49 |  |  |  |  |  |  |  |  |  | X |
| **6** | 37 | 5.22 | 55.71 |  |  |  | X |  |  |  |  |  |  |
| **7** | 26 | 3.67 | 59.38 |  |  |  |  | X |  |  |  |  |  |
| **8** | 26 | 3.67 | 63.05 |  |  | X |  |  | X |  |  |  |  |
| **9** | 22 | 3.10 | 66.15 |  |  |  |  |  | X |  | X |  |  |
| **10** | 19 | 2.68 | 68.83 |  |  |  |  |  |  |  |  | X |  |
|  | *221* | *31.17* | *100* | *(OTHER PATTERNS)* |
| **Total** | **709** | **100** |  | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

## II.III: Demographic Characteristics

Having established the number of participants in the health camps, it is important to understand the demographic characteristics of these individuals. It is useful to identify the data along the age axiom to determine what proportion of health camp attendances are older and younger people, respectively. Table 3 below presents the results. We can see that just over two thirds of those attending health camps are older persons. If we extend our analysis to incorporate the time series, we find that **less than 40 per cent of older persons attending the health camp came on two or more occasions.**

Figure 2 below present’s a two-way graph of age disaggregated data for health camp attendance. The histogram presents the frequency of cases attending the health camp by age group reflecting the total sum of individuals attending by age group. We can clearly see the largest group of people attending are aged 61-65 with the majority between the ages of 56 and 75. **Indeed, approximately 69 per cent of those attending are considered an older person.**

The line graph introduces a panel dimension to the data. This presents the proportion of each age group that attends more than one health camp. In other words, this shows what percentage of each age group is unique to the dataset. There is an unambiguous increase in the per cent of each age group attending more than one health camp as age increases. This is highest where there is the highest frequency of attendees; that is for older people. **In conclusion, those attending the health camp on two or more occasions tend to be older persons.**

Figure 2: Age distribution of individuals attending Health Camps

### II.III.I: Community Demographics

We can extend the demographic analysis by disaggregating at the community level. The demographic trend is consistent across all surveyed communities, with fewer older people attending more than one health camp. The results are presented in Table 5. Interestingly, **in Bak Amraek less than a fifth of older people and in Rumchey, less than 30 per cent of older people attended a health camp on more than one occasion.** For Chak Touch, Preaek Norint, Prean Nil 62, 55.6 and 69 per cent of older people attended more than one health camp, respectively. **These findings indicate significant levels of deterrence from health camp attendance for older people.** This needs to be further explored to determine the nature of the demand/supply side constraints.

Table 5: Health Camp Attendance by Age category and community

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Village** | **Non-OP**  | **OP**  | **% OP** |  | **# OP attend > 1** | **% OP attend > 1** |
| *Sample* | *382* | *850* | *68.99* |  | *169* | *39.57* |
| Bak Amraek | 76 | 129 | 62.93 |  | 19 | 17.92 |
| Chak Touch | 113 | 293 | 72.17 |  | 49 | 62.03 |
| Preaek Norint | 27 | 113 | 80.71 |  | 35 | 55.55 |
| Prean Nil | 28 | 84 | 75.00 |  | 25 | 69.44 |
| Rumchey | 138 | 231 | 62.60 |  | 41 | 28.67 |

## II.IV: Wealth Characteristics

Having established the demographic characteristics, it is useful to disaggregate the data along poverty lines to understand attendance for poor and non-poor people. Furthermore, we can re-introduce the age axiom to determine the proportion of poor older people attending health camps versus other groups. Table 6 shows us that 40.5 per cent of those attending health camps are considered poor. If we extend our analysis to incorporate the time series, we find that **38.8 per cent of** **the poor attending the health camp came on two or more occasions.**

In Bak Amreak less than a quarter of poor people attended more than one health camp whilst Rumchey has one third of poor people. Chak Touch and Preaek Norint have much more pro-poor health camps with two thirds in each attending on two or more occasions. **In summary, there are significant barriers for poor people in some communities, particularly Bak Amreak and Rumchey, more than communities, such as Preaek Norint. The key question here is the extent that poor people integrate with the health camp, and what are the barriers that are specific to the poor?**

**Table 6: Health Camp Attendance by Wealth group and community**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Village** | **Non-Poor** | **Poor** | **% Poor** |  | **# Poor attend > 1** | **% Poor attend > 1** |
| *Sample* | *733* | *499* | *40.50* |  | *99* | 38.82 |
| Bak Amraek | 81 | 124 | 60.49 |  | 22 | 22.68 |
| Chak Touch | 219 | 187 | 46.06 |  | 31 | 67.39 |
| Preaek Norint | 124 | 16 | 11.43 |  | 6 | 66.67 |
| Prean Nil | 68 | 44 | 39.29 |  | 13 | 59.09 |
| Rumchey | 241 | 128 | 34.69 |  | 27 | 33.33 |

## II.V: Qualitative Assessment

The drivers behind the health camp attendance findings were examined through the qualitative component with respect to supply and demand driven factors. The demand barriers, that is from older people themselves, were investigated through the household surveys with the results presented in Table 7. The main constraints identified were that **many do not attend the health camps due to them being occupied by livelihood activities (29.0%) or too sick to attend (18.8%).** Other notable constraints include **looking after family members (8.7%) and did not know the health camp was being conducted (13.0%).** One quarter of those surveyed went to all health camps conducted in their communities.

Two notable variations were found between the communities. In Chak Touch, 39.1 per cent of respondents did not attend due to livelihood activities against 20.8 and 27.3 per cent for Preaek Norint and Rumchey, respectively. Similarly, in Chak Touch only 4.3 per cent didn’t know the health camp was being conducted against 16.7 and 18.2 per cent in Preaek Norint and Rumchey, respectively. Similarly, 21.7 per cent did not attend due to illness in Chak Touch against 16.7 and 18.2 per cent in Preaek Norint and Rumchey, respectively.

Table 7: Barriers and Constraints to Health Camp Attendance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | **Chak Touch** | **Preaek Norint** | **Rumchey** | **Total** |
| **Work** | 39.13% | 20.83% | 27.27% | 28.99% |
| **Family** | 13.04% | 4.17% | 9.09% | 8.70% |
| **Didn’t know** | 4.35% | 16.67% | 18.18% | 13.04% |
| **Sick** | 21.74% | 16.67% | 18.18% | 18.84% |
| **Went to All** | 17.39% | 29.17% | 27.27% | 24.64% |

Another significant factor in attendance is the proximity of the health camp to the OPA member’s homes, with the proximity cited as very valuable. **Indeed, nearly three quarters of those surveyed lived within 500m of the health camp with the remainder living between 500m and 2km away.**  At the community level, 87 per cent of respondents in Chak Touch lived within 500m whilst in Rumchey only 54.6 per cent lived within 500m. This perhaps explains why in Chak Touch there were so few who didn’t know a health camp was being conducted against much higher proportions in the other two communities.

**Behavioural aspects are also critical in determining health camp attendance.** The focus group discussions revealed that many did not join or return as they felt normal so didn’t need to attend, decided the health camp doesn’t address their disease (i.e. no education and/or drugs), or they felt their disease was too serious and went to consult a private clinic. An additional interesting finding was from one older woman in Rumchey, who expressed that her husband and herself alternated who attended with someone staying at home. Thus, how households manage attending the health camp provides an interesting interaction and further research could explore why this is happening.

From the supply side, some members articulated they found the educational components too complicated. This is perhaps unsurprising as a result of high levels of illiteracy in the rural, specifically older, population. In Preaek Norint and Rumchey, OPA members articulated poor health camp staff behaviour detracted attendance. In Rumchey, the focus group discussions revealed that many health camps often start late (over an hour) while they wait for more participants leave many to leave**.** Other factors included shyness to undertaking exercise (which they had never done before) in public, and in Rumchey the presence of drugs offered by a Chinese company that can cure “100 diseases”.

## II.V: Summary

This section has explored the key trends around health camp attendance during the reference period. A total of 709 unique participants attended the health camps on 1,232 occasions across the five communities during the reference period. This gives an attendance rate of 24 per cent suggesting many do not regularly attend. Since these unique participants are greater than the number of OPA members in these communities, suggests the inclusion of non-OPA members who have also attended the health camps. Nonetheless, the evidence suggests that despite this, only approximately one quarter to one third of OPA members attend the health camps.

We found that two thirds of those attending health camps are older persons, with less than 40 per cent attending the health camps on two or more occasions. Indeed, significant variation was found between communities with less than a fifth of older people attending more than one, and less than a third in Rumchey compared to approximately two thirds in Chak Touch and Prean Nil. These findings indicate significant levels of deterrence from health camp attendance for older people. This trend closely followed that of the poor where 39 per cent attended two or more health camps. With significant barriers facing older and poor people in some communities particularly, suggesting intrinsic barriers for these groups for attending.

The drivers behind the health camp attendance findings were examined through the qualitative component with respect to supply and demand driven factors. From the demand perspective, many people were occupied by their livelihood activities, too sick to attend, were looking after family members, or even were not aware the health camp was being conducted. Similarly, many did not join or return as they felt healthy or did not think the health camp was wholly relevant for them. However, the proximity of the health camp to their homes was a significant benefit too many with nearly three quarters of those surveyed living within 500m of the health camp.

# Section III: Blood Pressure Screening

Having established health camp attendance, the analysis will explore the recording of blood pressure levels in the health camps. Following this, the analysis will interrogate changes in blood pressure levels to determine stabilisation. Since normal blood pressure levels are different for different people, we will restrict the parameters to those considered with controlled and uncontrolled blood pressure. The latter includes both hypertensive and hypotensive levels, using the readings outlined in the introduction. To do this, dichotomous variables will be used equal to “one” if a person’s blood pressure level is considered uncontrolled and “zero” if controlled. This gives us a total of three variables for analysis: hypertension, hypotension, uncontrolled.

A further key issue here is the ambiguity of a given individual’s blood pressure reading as we are unaware if they have or even are currently undergoing corrective medicine. This level of information is useful for separating those with a history of trying to control levels from those where this is a newer issue. Furthermore, we are also unaware of other prevailing health or socio-economic issues that could contribute. As such inferences without this information must be treated with caution.

## III.I: Blood Pressure Recording

A total of 678 blood pressure readings were recorded during the reference period. Table 7 below outlines how these vary between communities and periods. Chak Touch has the highest number of recordings followed by Bak Amraek with Rumchey the smallest number. For Chak Touch this is unsurprising as they had the highest number of attendances, however for Rumchey, this is surprising since they had a significant number of attendances with 10 health camps in the reference period. We can also see that August and October have the highest number of recordings. In contrast to attendance, there is significant variation in blood pressure recordings.

Table 7: Cases of blood pressure taken, by community and period

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mar** | **Apr** | **May** | **June** | **July** | **Aug** | **Sept** | **Oct** | **Nov** | **Dec** | **Av.** | **Total** |
| Bak Amraek | 52 |  | 61 |  |  | 52 |  | 31 |  |  | **49** | **196** |
| Chak Touch | 0 | 37 | 0 | 0 | 43 | 10 | 37 | 44 | 45 | 47 | **26.3** | **263** |
| Preaek Norint | 22 |  | 27 |  |  | 52 |  | 29 |  |  | **32.5** | **130** |
| Prean Nil | 0 |  | 0 |  |  | 30 |  | 23 |  |  | **13.25** | **53** |
| Rumchey | 4 | 5 | 4 | 4 | 2 | 0 | 0 | 4 | 11 | 6 | **4** | **40** |
| **Total** | **78** | **42** | **92** | **4** | **45** | **144** | **37** | **131** | **56** | **53** | **68.2** | **682** |

To determine the proportion of people attending a health camp with their blood pressure taken, we aggregate Tables 2 and 3 to give the total number of people attending a health camp or received a house visit. Next we divide the number screened with the calculated aggregate. These results are presented in Table 8.

**The average screening rate at the health camps during the reference period is 53 per cent.** Bak Amraek and Preaek Norint have the highest blood pressure screening percentages. Rumchey has a significantly low screening rate at only 10 per cent with two months registering 0 screened. Indeed both Chak Touch and Prean Nil both also have three and two periods, respectively, with 0 participants blood pressure screened. **This indicates** **a significant gap in screening levels with almost half of health camp attendants not being screened.**

Table 8: Percent of cases attending health camps with their blood pressure recorded

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
| Bak Amraek | 92.9 |  | 96.8 |  |  | 98.1 |  | 93.9 |  |  | **95.6** |
| Chak Touch | 0.0 | 97.4 | 0.0 | 0.0 | 97.7 | 23.8 | 94.9 | 95.7 | 95.7 | 92.2 | **62.2** |
| Preaek Norint | 95.7 |  | 77.1 |  |  | 98.1 |  | 100 |  |  | **92.9** |
| Prean Nil | 0.0 |  | 0.0 |  |  | 90.9 |  | 85.2 |  |  | **45.3** |
| Rumchey | 7.4 | 14.7 | 11.1 | 9.5 | 4.5 | 0.0 | 0.0 | 9.5 | 26.2 | 16.7 | **10.0** |
| Total | **40.8** | **58.3** | **43.2** | **5.1** | **51.1** | **66.1** | **50.0** | **74.0** | **62.9** | **60.9** | **53.0** |

Figure 3 below present’s a two-way graph of age disaggregated data for health camp blood pressure recordings. The histogram presents the frequency of cases with blood pressure recorded by age group reflecting the total sum of individuals screened by age group. We can clearly see the largest group of people are 61-65 (same as attendance) with the majority between the ages of 56-70. **Indeed, analogous to attendance, approximately 65.5 per cent of those with their blood pressure recorded are considered an older person.**

The line graph introduces a panel dimension to the data. This presents the proportion of each age group that has their blood pressure recorded in two or more health camps. In other words, this shows what percentage of each age group is unique to the dataset. There is an unambiguous increase in the per cent of each age group having their blood pressure recorded more than once as age increases. **In conclusion, those with their blood pressure recorded on two or more occasions tend to be older persons.**

Figure 3: Age Distribution of Individuals Screened at the Health Camps

## III.II: Participatory Pattern Analysis

Participation pattern analysis allows the unique identification of the distribution of those sampled on multiple occasions. This is significant as it gives a nuanced perspective away from previous discussions, allowing us to understand how impact measurements are organised and where unique cases derive.

### III.II.I: Sample level

A total of 441 (62.2 per cent) individuals had their blood pressure recorded across the 10 periods. From the attendance pattern analysis, this means that **268 individuals attended at least one health camp but never had their blood pressure recorded.** The average distribution is approximately 1.5 periods per individual with a maximum observed as 6 periods. The distribution of T*i* shows that 50 per cent of individuals had their blood pressure recorded only once, 25 per cent were observed for two or more periods, and only 5 per cent were observed for four or more periods.

Table 9 presents the participatory pattern analysis for the first 10 patterns in the sample comprising 77.1 per cent of individuals with blood pressure recordings. As expected, August has the highest frequency of people screened (14.74 per cent) followed by May (13.83 per cent) and March (10.88 per cent). Interestingly, similar to attendance, this demonstrates increasingly levels of unique cases as the project progresses with relatively few opportunities to track changes in blood pressure.  **Indeed, two thirds of individuals only had one blood pressure recording.**

Interestingly, only 10.2 per cent (45) of individuals screened and listed in the first 10 patterns had two readings taken and none of the first 10 patterns contain more than two observations. Hence, impact measurements of the health camps on blood pressure that wanted to track changes within individuals are best undertaken in **patterns 5 (Aug & Oct) and 10 (May & Aug).** It is important to note that later patterns, with smaller frequencies, contain further observations that will increase the number of observations to measure impact from. **In summary, at the sample level there are relatively few unique cases to examine changes over time.** Next, we will examine how this phenomenon translates at the community level and what this means for impact assessment.

**Why are there so few follow ups during the health camps?**

Table 9: Participatory Pattern Analysis (Sample)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pattern** | **Frequency** | **Percent** | **Cumulative** | **Pattern** |
| M | A | M | J | J | A | S | O | N | D |
| **1** | 65 | 14.74 | 14.74 |  |  |  |  |  | X |  |  |  |  |
| **2** | 61 | 13.83 | 28.57 |  |  | X |  |  |  |  |  |  |  |
| **3** | 48 | 10.88 | 39.46 | X |  |  |  |  |  |  |  |  |  |
| **4** | 43 | 9.75 | 49.21 |  |  |  |  |  |  |  | X |  |  |
| **5** | 31 | 7.03 | 56.24 |  |  |  |  |  | X |  | X |  |  |
| **6** | 30 | 6.80 | 63.04 |  |  |  |  |  |  |  |  |  | X |
| **7** | 19 | 4.31 | 67.35 |  |  |  |  |  |  |  |  | X |  |
| **8** | 15 | 3.40 | 70.75 |  | X |  |  |  |  |  |  |  |  |
| **9** | 14 | 3.17 | 73.92 |  |  |  |  | X |  |  |  |  |  |
| **10** | 14 | 3.17 | 77.10 |  |  | X |  |  | X |  |  |  |  |
|  | *70* | *22.90* | *100* | *(OTHER PATTERNS)* |
| **Total** | **441** | **100** |  | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

### III.II.II: Bak Amraek

Blood pressure readings were recorded in all health camps for Bak Amraek. **The distribution of readings shows that approximately only 15 per cent of individuals were screened in two or more periods.** It is therefore very difficult to robustly measure changes in blood pressure levels due to the high frequency of unique cases screened once during the reference period.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bak Amraek** | **Frequency** | **Percent** | **Cumulative** | **Pattern** |
| M | A | M | J | J | A | S | O | N | D |
| **1** | 47 | 28.83 | 28.83 |  |  | X |  |  |  |  |  |  |  |
| **2** | 35 | 21.47 | 50.31 | X |  |  |  |  |  |  |  |  |  |
| **3** | 34 | 20.86 | 71.17 |  |  |  |  |  | X |  |  |  |  |
| **4** | 23 | 14.11 | 85.28 |  |  |  |  |  |  |  | X |  |  |
| **5** | 5 | 3.07 | 88.34 |  |  | X |  |  | X |  |  |  |  |
| **6** | 5 | 3.07 | 91.41 | X |  |  |  |  |  |  | X |  |  |
| **7** | 5 | 3.07 | 94.48 | X |  |  |  |  | X |  |  |  |  |
| **8** | 4 | 2.45 | 96.93 | X |  | X |  |  |  |  |  |  |  |
| **9** | 2 | 1.23 | 98.16 | X |  | X |  |  | X |  |  |  |  |
| **10** | 3 | *1.84* | *100* | *(OTHER PATTERNS)* |
| **Total** | **163** |  |  | **X** |  | **X** |  |  | **X** |  | **X** |  |  |

### III.II.III: Chak Touch

Blood pressure readings were recorded in 7 health camps during the reference period. As previously discussed, the health camps did not record blood pressure levels for March, May and June. **The distribution of the readings shows approximately 42 per cent of individuals were screened in two or more periods.** As such, Chak Touch has the highest number of people screened on more than one occasion and **provides a good community to undertake impact assessment.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Chak Touch** | **Frequency** | **Percent** | **Cumulative** | **Pattern** |
| M | A | M | J | J | A | S | O | N | D |
| **1** | 26 | 20.80 | 20.80 |  |  |  |  |  |  |  |  |  | X |
| **2** | 13 | 10.40 | 31.20 |  |  |  |  | X |  |  |  |  |  |
| **3** | 10 | 8.00 | 39.20 |  | X |  |  |  |  |  |  |  |  |
| **4** | 9 | 7.20 | 46.40 |  |  |  |  |  |  |  |  | X |  |
| **5** | 8 | 6.40 | 52.80 |  |  |  | X |  |  |  |  |  |  |
| **6** | 6 | 4.80 | 57.60 |  |  |  |  |  |  |  | X |  |  |
| **7** | 4 | 3.20 | 60.80 |  | X |  |  | X |  | X | X | X |  |
| **8** | 3 | 2.40 | 63.20 |  |  |  |  |  |  | X |  | X |  |
| **9** | 3 | 2.40 | 65.60 |  |  |  |  |  |  | X | X | X | X |
|  | *43* | *34.40* | *100* | *(OTHER PATTERNS)* |
| **Total** | **125** |  |  |  | **X** |  |  | **X** | **X** | **X** | **X** | **X** | **X** |

### III.II.IV: Preaek Norint

Blood pressure readings were recorded in all four health camps during the reference period. In contrast to the other communities, pattern 1 contains observations from two periods that equates to a quarter of those screened. Moreover, **there are 42 (55 per cent) individuals in Preaek Norint that were screened at two or more health camps.** Hence, Preaek Norint also provides a good community to undertake impact assessment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Preaek Norint** | **Frequency** | **Percent** | **Cumulative** | **Pattern** |
| M | A | M | J | J | A | S | O | N | D |
| **1** | 19 | 25.00 | 25.00 |  |  |  |  |  | X |  | X |  |  |
| **2** | 13 | 17.11 | 42.11 |  |  |  |  |  | X |  |  |  |  |
| **3** | 10 | 13.16 | 55.26 |  |  | X |  |  |  |  |  |  |  |
| **4** | 10 | 13.16 | 68.42 | X |  |  |  |  |  |  |  |  |  |
| **5** | 9 | 11.84 | 80.26 |  |  | X |  |  | X |  |  |  |  |
| **6** | 3 | 3.95 | 84.21 | X |  |  |  |  | X |  | X |  |  |
| **7** | 3 | 3.95 | 88.16 | X |  | X |  |  | X |  |  |  |  |
| **8** | 2 | 2.63 | 90.79 |  |  | X |  |  |  |  | X |  |  |
| **9** | 2 | 2.63 | 93.42 | X |  |  |  |  |  |  | X |  |  |
| 10 | *5* | *6.58* | *100* | *(OTHER PATTERNS)* |
| **Total** | **76** |  |  | **X** |  | **X** |  |  | **X** |  | **X** |  |  |

### III.II.V: Prean Nil

Blood pressure recordings were taken in half of the health camps: August and October. The distribution of recordings shows that approximately half were screened in two periods.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Prean Nil** | **Frequency** | **Percent** | **Cumulative** | **Pattern** |
| M | A | M | J | J | A | S | O | N | D |
| **1** | 18 | 43.90 | 43.90 |  |  |  |  |  | X |  |  |  |  |
| **2** | 12 | 29.27 | 73.17 |  |  |  |  |  | X |  | X |  |  |
| **3** | *11* | *26.83* | *100* |  |  |  |  |  |  |  | X |  |  |
| **Total** | **41** |  |  |  |  |  |  |  | **X** |  | **X** |  |  |

### III.II.VI: Rumchey

Blood pressure readings were recorded in 8 health camps with August and September with no-one screened. Despite the largest number of health camps with people screened, Rumchey has the lowest number of persons screened at 36. The distribution of readings shows that only two (5.6 per cent) individuals had blood pressure taken in two or more periods. Hence, **Rumchey has the lowest screening rate, lowest frequency of individuals screened again, despite having the highest number of health camps, attendances at health camps, and health camps that undertook screening.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Rumchey** | **Frequency** | **Percent** | **Cumulative** | **Pattern** |
| M | A | M | J | J | A | S | O | N | D |
| **1** | 10 | 27.78 | 27.78 |  |  |  |  |  |  |  |  | X |  |
| **2** | 5 | 13.89 | 41.67 |  | X |  |  |  |  |  |  |  |  |
| **3** | 4 | 11.11 | 52.78 |  |  |  |  |  |  |  |  |  | X |
| **4** | 4 | 11.11 | 63.89 |  |  |  | X |  |  |  |  |  |  |
| **5** | 4 | 11.11 | 75.00 |  |  | X |  |  |  |  |  |  |  |
| **6** | 3 | 8.33 | 83.33 |  |  |  |  |  |  |  | X |  |  |
| **7** | 3 | 8.33 | 91.67 | X |  |  |  |  |  |  |  |  |  |
| **8** | 1 | 2.78 | 94.44 |  |  |  |  |  |  |  | X | X | X |
| **9** | 1 | 2.78 | 97.22 |  |  |  |  | X |  |  |  |  |  |
| **10** | 1 | 2.78 | *100* | X |  |  |  | X |  |  |  |  | X |
| **Total** | **36** |  |  | **X** | **X** | **X** | **X** | **X** |  |  | **X** | **X** | **X** |

## III.III: Hypertension

The criteria for diagnosis of hypertension were systolic blood pressure (SBP) of ≥140 mm Hg and/or diastolic blood pressure (DBP) of ≥90 mm Hg. Current data from Cambodia indicates a prevalence rate of 11.2 per cent for adults aged 25-64.[[3]](#footnote-3)

As previously discussed, blood pressure readings were coded into dichotomous variables equal to “one” if the individual is hypertensive following the WHO definition, and “zero” for individuals with normal for those that are not considered hypertensive. The results are presented in Table 15. It is important to note, that within these parameters those considered hypotensive are included in the “zero”. This will be addressed later but we are concerned now with only those considered hypertensive.

**A total of 162 cases of hypertension were identified in all communities during the reference period.** In absolute terms, the highest number of cases was found in Preaek Norint with the lowest in Prean Nil. August had notably the highest number of hypertensive cases, largely derived from health camps conducted in all five villages. However, there is significant variation between August and the other periods. Note analysis on hypertensive cases will be addressed in Section IV with the impact measures.

Table 15: Hypertensive cases, by community and period

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mar** | **Apr** | **May** | **June** | **July** | **Aug** | **Sept** | **Oct** | **Nov** | **Dec** | **Total** |
| Bak Amraek | 5 | - | 2 | - | - | 11 | - | 5 | - | - | **23** |
| Chak Touch | - | 7 | - | - | 5 | 5 | 4 | 8 | 3 | 6 | **38** |
| Preaek Norint | 6 | - | 14 | - | - | 38 | - | 11 | - | - | **69** |
| Prean Nil | - | - | - | - | - | 6 | - | 4 | - | - | **10** |
| Rumchey | 3 | 3 | 3 | 2 | 0 | - | - | 1 | 7 | 3 | **22** |
| **Total** | **14** | **10** | **19** | **2** | **5** | **60** | **4** | **29** | **10** | **9** | **162** |

Table 16 unpacks the data further to allow analysis on the proportion of blood pressure recordings that are hypertensive. This allows us to control for the frequency of recordings. **This gives us a hypertension prevalence rate of 23.9 per cent.** This method shows a notable finding **over half of those with blood pressure recordings in Rumchey are hypertensive**. With such a small number of blood pressure recordings in this village during the reference period, this would **suggest purposive targeting towards hypertensive cases**. This will be further addressed later. Preaek Norint has similar findings, with the notable difference of there being three times more blood pressure recordings than in Rumchey. Hence, this suggests that **hypertension is a significant issue in Preaek Norint.**

Table 16: Percent of cases reported as hypertensive

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
| Bak Amraek | 9.6 |  | 3.3 |  |  | 22.9 |  | 16.1 |  |  | **12.0** |
| Chak Touch |  | 18.9 |  |  | 11.9 | 50.0 | 10.8 | 18.2 | 6.7 | 12.8 | **14.5** |
| Preaek Norint | 27.3 |  | 51.9 |  |  | 73.1 |  | 37.9 |  |  | **53.1** |
| Prean Nil |  |  |  |  |  | 20.0 |  | 17.4 |  |  | **18.9** |
| Rumchey | 75.0 | 60.0 | 75.0 | 50.0 | 0.0 |  |  | 25.0 | 63.6 | 50.0 | **55.0** |
| Total | **17.9** | **23.8** | **20.7** | **50.0** | **11.4** | **42.9** | **10.8** | **22.1** | **17.9** | **17.0** | **23.9** |

Figure 4 presents hypertension prevalence rates in the BMZ communities against a STEPS survey for Cambodia from 2010.[[4]](#footnote-4) We can see that the prevalence rate in the BMZ communities is much lower for the first two age groups, and is likely a result of a small number of observations. In the 45-54 and 55-64, the prevalence rate is very close to the STEPS programme for these groups. There is no data available for those over 65. Taking the total prevalence rate for those under 65 we can see the BMZ rate is significantly higher, around double. If we include those over 65 we can see a rise in the hypertension prevalence rate.

Figure 4: High Blood Pressure Prevalence rate in BMZ communities and STEPS

## III.IV: Hypotension

Hypotension levels are measured if SBP ≤90 mm Hg and/or DBP ≤60 mm Hg. As previously discussed, blood pressure readings were coded into dichotomous variables equal to “one” if the individual is hypotensive following the XXX definition, and “zero” for individuals with normal for those that are not considered hypotensive. The results are presented in Table 17 and 18. Again it is important to note, that within these parameters those considered hypertensive are included in the “zero”.

A total of 192 cases of hypotension were identified in all communities during the reference period. This translates to **a prevalence rate of 28.4 per cent for hypotension.** **This figure suggests that hypotension is a more significant issue than hypertension in the surveyed communities.** In absolute terms, the highest number of cases was found in Chak Touch with the lowest in Prean Nil and Rumchey. **Controlling for blood pressure recordings, shows us that Prean Nil has the highest prevalence rate at 64.2 per cent with Chak Touch having a prevalence rate of 40.1 per cent.** Note analysis on hyptertensive cases will be addressed in Section IV with the impact measures.

Table 17: Hypotensive cases, by community and period

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mar** | **Apr** | **May** | **June** | **July** | **Aug** | **Sept** | **Oct** | **Nov** | **Dec** | **Total** |
| Bak Amraek | 20 | - | 12 | - | - | 11 | - | 4 | - | - | **47** |
| Chak Touch | - | 9 | - | - | 19 | 4 | 15 | 15 | 23 | 20 | **105** |
| Preaek Norint | 1 | - | 1 | - | - | 1 | - | 0 | - | - | **3** |
| Prean Nil | - | - | - | - | - | 15 | - | 19 | - | - | **34** |
| Rumchey | 1 | - | 0 | 0 | - | - | - | 2 | 0 | 0 | **3** |
| **Total** | **22** | **9** | **13** | **0** | **19** | **31** | **15** | **40** | **23** | **20** | **192** |

Table 18: Percent of cases recorded reported as hypotensive

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
| Bak Amraek | 38.5 |  | 19.7 |  |  | 22.9 |  | 12.9 |  |  | **24.5** |
| Chak Touch |  | 24.3 |  |  | 45.2 | 40.0 | 40.5 | 34.1 | 51.1 | 42.6 | **40.1** |
| Preaek Norint | 4.6 |  | 3.7 |  |  | 1.9 |  | 0.0 |  |  | **2.3** |
| Prean Nil |  |  |  |  |  | 50.0 |  | 82.6 |  |  | **64.2** |
| Rumchey | 25.0 |  | 0.0 | 0.0 |  |  |  | 50.0 | 0.0 | 0.0 | **7.5** |
| Total | **28.2** | **21.4** | **14.1** | **0.0** | **43.2** | **22.1** | **40.5** | **30.5** | **41.1** | **37.7** | **28.4** |

## III.V: Uncontrolled Blood Pressure

Aggregating those considered hypertensive and hypotensive illustrates the number of people with uncontrolled blood pressure. This demonstrates what proportion of those screened have uncontrolled blood pressure. **A total of 353 cases of uncontrolled blood pressure were recorded giving a prevalence rate of 50.2 per cent.** Prean Nil had the highest prevalence rate at 79.2 per cent followed by Rumchey with Bak Amraek the lowest. **These high rates of uncontrolled blood pressure suggest purposive screening and recording of those with uncontrolled blood pressure.** Indeed, this can be examined through the household surveys and focus group discussions to understand the recording and screening process.

Table 19: Uncontrolled Blood Pressure, by community and period

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
| Bak Amraek | 44.2 |  | 23.0 |  |  | 41.7 |  | 29.0 |  |  | **34.4** |
| Chak Touch |  | 43.2 |  |  | 52.4 | 50.0 | 45.9 | 52.3 | 57.8 | 55.3 | **51.5** |
| Preaek Norint | 31.8 |  | 55.6 |  |  | 75.0 |  | 37.9 |  |  | **55.4** |
| Prean Nil |  |  |  |  |  | 70.0 |  | 91.3 |  |  | **79.2** |
| Rumchey | 100.0 | 60.0 | 75.0 | 50.0 |  |  |  | 75.0 | 63.6 | 50.0 | **62.5** |
| Total | **43.6** | **45.2** | **34.8** | **50.0** | **50.0** | **60.7** | **45.9** | **51.1** | **58.9** | **54.7** | **50.2** |

## III.VI: Expected number of older people not screened

Using the analysis generated so far, we can determine the approximate expected number of older persons with uncontrolled blood pressure that were not screened. Table 20 below presents the results. As previously discussed, there were a total of 488 older cases screened at the health camps out of 850 older cases attending. **From these 488 cases, 272 (55.73 per cent) had uncontrolled blood pressure: 135 (27.66 per cent) were found hypertensive and 137 (28.07 per cent) were hypotensive.** This highlights a higher prevalence rate for older people attending the health camps for uncontrolled blood pressure.

From this we can establish there were 362 (42.59 per cent) older people not screened. Assuming we have a representative sample in each of the communities with their blood pressure taken, we can use the findings from those screened to determine the expected number of older people with uncontrolled blood pressure not screened. **These figures report a total of 202 older people with uncontrolled blood pressure not picked up: 100 older people with hypertension and 102 with hypotension.**

Using a similar approach, we can determine from which communities these older people reside. The largest numbers of older people not screened are found in Chak Touch and Rumchey; hence this is consistent with these communities having the largest gap. Interestingly, the gap for Rumchey is significant for hypertensive cases; more than the expected number at the sample level. This supports the previous hypothesis of purposive targeting with intentionally higher numbers reported. Conversely, we see the reverse occurring for Hypotension with far fewer reported in the communities than at the sample level. Hence, similar to hypertension, this suggests bias in the recording of results.

Table 20: Predicted Numbers of OP with uncontrolled blood pressure, by community

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **OP attend** | **OP screened** | **OP not screened** | **Uncontrolled BP** | **Not picked up** |
| **Hyper** | **Hypo** | **Hyper** | **Hypo** |
| Sample | 850 | 488 | 362 | 135 | 137 | 100 | 102 |
| Bak Amraek | 129 | 126 | 3 | 8 | 61 | 0 | 1 |
| Chak Touch | 293 | 187 | 106 | 33 | 74 | 19 | 42 |
| Preaek Norint | 113 | 106 | 7 | 57 | 4 | 4 | 0 |
| Prean Nil | 84 | 37 | 47 | 8 | 23 | 10 | 29 |
| Rumchey | 231 | 32 | 199 | 19 | 3 | 118\* | 19\* |

\* These results following the residual from the other communities should be 67 hypertensive missed and 30 hypotensive.

## III.VII: Demographic Characteristics

Since the OPAs are intergenerational in Cambodia, it is important to disaggregate the data by age to see if there are any demographic trends. Pairwise correlation analysis allows us to understand whether there is an association between age and blood pressure levels. We are interested in those considered hyper/hypotensive so will use the dichotomous BP variables against the continuous age and an older person dummy variable equal to one if the individual is over 55 years of age.

There is a positive and significant association between hypertension (P<0.001) and the age variable, and negative but insignificant association between hypotension and age (P>0.10). Similarly, we find a positive and significant association between hypertension (P<0.001) and the older person dummy variable but no association for hypotension (P>.10) and the older person dummy variable. Tests for association with the continuous systolic and diastolic rates were consistent with the categorical variables. **Therefore, we can conclude that consistent with our previous analysis, hypertension levels are linked with ageing; however, hypotension levels are not.**

Analysis of the number of older people with blood pressure readings show that 289 of the 441 (72 per cent) of individuals are OP (i.e. >55); of whom 80 (27.7 per cent) have hypertension and 81 (28.1 per cent) have hypotension. This means 161 older persons have uncontrolled blood pressure comprising 55.7 per cent. This is slightly higher than the sample average, reinforcing the previous discussion where ageing leads to a higher likelihood of uncontrolled blood pressure. However, this difference is not significant.

## III.VIII: Hospital Referrals

A total of seven (1 per cent) individuals were referred to hospital during the reference period. Table 21 below maps their blood pressure levels with the period marked in red for when they were referred. It is clear that three of the cases attended the heath camps but did not have their blood pressure recorded. These three cases were all from the Rumchey community supporting the poor data collection. Only one of these individuals attended a health camp again. The other four individuals were all from Chak Touch. In three of the remaining individuals, they were clearly referred for hypertension whilst it is unclear why 556 was referred. Indeed, there were also instances of these individuals attending a health camp but not having their blood pressure taken.

Table 21: Blood Pressure mapping of households referred to hospital

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
| 50 | \* | \* |  |  | \* |  |  |  |  |  |
| 59 |  | \* |  |  |  |  |  |  |  |  |
| 71 |  | \* |  |  |  |  |  |  |  |  |
| 557 |  | 110/60 | \* |  | 130/70 | \* |  | 130/70 | 120/70 | 170/70 |
| 556 |  | 140/70 |  |  |  |  |  | 110/80 | 130/70 | 130/70 |
| 514 | \* | 130/80 | \* | \* | 150/70 | 120/60 | 170/70 | 110/70 |  |  |
| 573 |  |  | \* |  |  | \* |  |  | 160/70 |  |

\*Attended but no BP reading recorded

## III.IX Qualitative Assessment of Blood Pressure Screening

The qualitative component assessed the cause of the blood pressure screening rate. In doing so, the research explored blood pressure screening with respect to supply and demand driven factors. **A principal constraint identified in all the focus group discussions and key informant interviews was that blood pressure was checked only for those who wanted it checked.** This suggests that the poor screening rate is largely driven by demand from older people themselves and closely follows the reasons for not attending the health camps – through being too busy with livelihood activities and family, do not think they have high blood pressure, and so on (for further discussion see Section II.V). This problem was significant in Rumchey, and goes some way to explain the poor screening rate relative to attendance.

However, **this is accompanied by a significant simultaneous supply side constraint with blood pressure checked at the health camp but not recorded.** Approximately two thirds of respondents from the household surveys said they were recorded every time with one in ten recorded only some of the time. There was significant variation between the communities with only half of respondents in Rumchey screened every time whilst this figure increased to 70 per cent in Chak Touch and Preaek Norint. These two simultaneous constraints go some way to explain the screening rate recorded.

A further supply side barrier that was expressed was the health camp waiting time. Analysis from the household surveys finds considerable variation in waiting times. In Chak Touch and Preaek Norint, approximately half of those screened had a waiting time of 30 minutes to an hour with a further third waiting 1-2 hours. By contrast, almost one third of respondents in Rumchey waited for two or more hours to have their blood pressure recorded compared to 4 per cent in the other two villages. Many respondents said they went home due to this as they were busy. Furthermore, with generally homogenous average attendance rates in the three communities,[[5]](#footnote-5) this indicates significant issues in the Rumchey health camp in undertaking blood pressure readings.

Other blood pressure reading constraints were identified as: **(I) long educational components** lead to little time for checking blood pressure; **(II) rain** leads many to go home early; **(III) insufficient medicine** means many do not attend particularly where there are high indirect costs through transportation to access health centres for drugs; and **(IV) insufficient human resources** impeded the health camps leading to a high doctor to patient ratio. This in turn led to long waiting times to have blood pressure checked with many unable to do this.

## III.X: Summary

A total of 678 blood pressure cases were recorded over the reference period, comprising 441 (62 per cent) unique cases, giving an average screening rate of 53 per cent in the health camps. With only one in two screened, this suggests a significant gap in screening levels with almost half of health camp attendants not being screened. This was notable in Rumchey, with a screening rate of only 10 per cent during the reference period. Indeed approximately five per cent were screened in four or more periods following the project design. Of those screened, nearly two thirds had their blood pressure recorded only once with those screened on two or more occasions tending to be older persons. Hence, we find relatively few unique cases to examine changes and impact of the health camps on individuals over time.

A total of 353 cases of uncontrolled blood pressure were recorded giving a prevalence rate of 50.2 per cent; of which 162 (23.9 per cent) were hypertensive and 192 (28.3 per cent) were hypotensive. These figures suggest that hypotension is a more significant issue than hypertension in the surveyed communities and could derive from prioritisation of hypertensive cases. In some communities, significantly high levels of uncontrolled blood pressure were found suggesting purposive recording; in Prean Nil 79.2 per cent had uncontrolled blood pressure whilst in Rumchey this figure was 62 per cent.

Predictions on the number of older persons with uncontrolled blood pressure that were not screened found a total of 202 older people not picked up: 100 older people with hypertension and 102 with hypotension. Significant variations in hypertensive cases for Rumchey suggest those recorded are not representative of the community supporting the previous hypothesis of purposive targeting with intentionally higher numbers reported.

From the qualitative component on blood pressure screening, a principal constraint identified in all the focus group discussions and key informant interviews was that blood pressure was checked only for those who wanted it checked. This is accompanied by a significant simultaneous supply side constraint with blood pressure checked at the health camp but not recorded. Further barriers identified included health camp waiting time leading many to return home, long educational componentslead to little time for checking blood pressure,rain leads many to go home early, and insufficient medicine and human resources.

# Section IV: Impact Measures

Using the preceding analysis poses several restrictions in the ability to undertake a robust impact assessment of blood pressure measures. First, there is a low frequency of re-attending health camps leading to significant variation in those who are attending each camp. Second, many OPA members had their blood pressure measured once; hence there is no follow up data to indicate whether their blood pressure has improved. Third, there is no baseline data from which a first measurement can be taken as OPA members may have previously attended health camps, and/or may have attended health camps without having their blood pressure measured. Indeed, there are numerous examples of this in the communities.

Analysis from the household surveys indicates that at least three quarters of those surveyed said they had attended a health camp prior to the reference period. Only 7.3 per cent were attending their first health camp with the remainder unable to remember when they first attended a health camp. As such, we have no valid baseline level from which to undertake impact assessment and determine a causal link between the heath camps and blood pressure levels. However, changes can be tracked through people within the period and overall changes in blood pressure during the reference period can also be assessed.

These constraints make impact analysis difficult, for example the variation in the frequency and period when individuals have their blood pressure recording is large leading to insufficient observations to measure mean changes for an individual. A similar issue is found at the community level with the exception of Chak Touch and Preaek Norint. There are however several approaches which can be used: (I) changes in the mean and standard deviation of SBP and DBP between health camps; (II) changes in the number of people recorded as hypertensive or hypotensive between periods; (III) transitional probabilities of whether an individual’s BP is hypertensive or hypotensive in (t0) and becomes normal in the next health camp (t0+1).

## IV.I: Mean Blood Pressure Readings

### IV.I.I: Systolic Blood Pressure

Mean SBP and DBP readings were calculated for each of the surveyed periods. Due to insufficient numbers of health camps June and September are dropped. Figures 4 and 5 present the results, with hypertension and hypotension boundaries. In addition, a baseline level reading that was established in three uncorrelated communities is included. From Figure 4, it is clear that there is little variation in the mean SBP over the reference period. However, there is a marginal increase in the SBP during the reference period.

In all periods, the mean SBP line lies below the baseline. Inferences here must be treated with caution however, as the distance to the baseline is largest at the beginning of the reference and closes over the health camps. In summary, there is little indication of changes in SBP and suggests that the variation in who attends each health camp averages out any potential changes using this method.

Figure 5: Mean SBP by Period

### IV.I.II: Diastolic Blood Pressure

Figure 5 presents the DBP over the reference, with June and September also omitted. In contrast to SBP there is significant variation in mean DBP with a clear fall over the reference period. This is predominantly driven by changes in Chak Touch. In one period, August, the DBP moves above the baseline level. Interestingly, the DBP level deviates significantly towards the hypotension boundary. **In summary, we can conclude that there has been a significant fall in the DBP levels; however, the significance of this fall is problematic as it approaches the hypotension threshold moving away from the ideal 80 mm Hg. This suggests it is the falling DBP level that is accounting for the higher prevalence of hypotension rather than the SBP.**

Figure 6: Mean DBP by Period

### IV.I.III: Standard Deviation in Systolic and Diastolic levels

Beyond mean blood pressure levels, analysis of the standard deviation allows us to understand the distribution of SBP and DBP around the mean. Figure 6 presents the standard deviations for the systolic and diastolic recordings. We can see the SBP data becomes less spread over the reference period indicating the SBP mean provides a useful reference point. Over time the DBP data remains consistent, however there is increased variation during the middle of the reference period.

Figure 7: Standard Deviation in SBP and DBP by Period

This analysis can be extended by examining the coefficient of variation that tells us the extent the data is uniform, and is presented in Figure 7. Overall we can see uniformity in the data.

Figure 8: Coefficient of Variation, SBP & DBP

## VI.II: Number of Hypertensive and Hypotensive Cases

An alternative approach would be to measure impact by the number of cases recorded with uncontrolled blood pressure. Using the figures from Tables 15 and 17, Figure 8 presents these results. The clustered histogram presents the absolute numbers of hypertensive and hypotensive cases. It is clear that absolute numbers were significantly higher in August followed by October. There is also significant variation in the number of absolute cases recorded for both hypertension and hypotension. Due to this variation and the reasons discussed in the introduction to this section, it is difficult to determine changes in absolute numbers as we do not have a baseline.

A more useful method is to examine changes in the prevalence rate between periods. First, the hypertensive prevalence rate is represented by the purple line. We can see over the reference period large variability in the prevalence rate moving from 17.9 to 17 per cent, peaking in August at 43 per cent. **This would suggest a marginal fall in hypertensive prevalence.** Second, hypotension prevalence is represented by the green line. We can see over the reference period an increase in the prevalence rate of hypotension from 28.2 to 37.7 per cent, peaking in July at 43 per cent. **This suggests a significant increase in hypotensive prevalence.**

Figure 9: Number and Percent of Hypertensive and Hypotensive Cases, by Period

## VI.III: Transitional Probabilities

The previous two approaches focus on aggregated observations. Now, we analyse changes in individuals themselves. To do this, the dataset is restricted to those surveyed to two or more periods. It is important to note for those surveyed in more than two periods will be included in the analysis more than once. This allows us to include changes in these people in the probability matrix.

Transitional probabilities interrogate whether an individual was hyper/hypotensive in time t*0* and remained hyper/hypotensive in t*0*+1. This approach allows the identification of changes in blood pressure levels at the individual level between health camps they were recorded at. Our focus is on the transition between having uncontrolled blood pressure (hyper/hypotensive) and blood pressure levels returning to normal levels, and those with uncontrolled blood pressure that remains uncontrolled. As such, this allows us to understand the extent to which blood pressure levels change within the communities.

It was possible to count how many of these improved after their first reading. In fact, many people showed even worse readings on future readings.

### VI.III.I: Hypertension

Table 21 presents the results for hypertension for the sample and communities. At the sample level, 13.3 per cent of those with normal blood pressure became hypertensive in the next period. Those that were hypertensive had a 46.9 per cent chance of remaining hypertensive in the next period. In absolute numbers, this compares to 23 people becoming hypertensive with 34 returning to normal blood pressure suggesting a marginal fall in hypertension. **This suggests that there is stabilisation in the incidence of hypertension but still remains prevalent with only around half of those sampled experiencing normal blood pressure.**

Disaggregating the data by community allows us to understand changes in hypertension within each community. In Chak Touch, 62.5 per cent of hypertensive cases had normal blood pressure in the next period against 8.8 per cent becoming hypertensive. A similar story can be found in Preaek Norint with 47.22 per cent of cases no longer hypertensive in the next period. However, this fall was accompanied by a 44.4 per cent increase in individuals with hypertension. **These results follow the sample level analysis with stabilisation in the incidence of hypertension, with the exception of Preaek Norint with a high incidence rate, but the prevalence remains high.** Hypertensive cases surveyed across two or more periods are negligible in Rumchey and Prean Nil so are not included in this discussion.

Table 22: Transitional Probabilities of Hypertension at the sample and community levels.

|  |  |  |  |
| --- | --- | --- | --- |
| **ti** | **ti+1** |  | **ti+1** |
| **Sample** | **0 – No** | **1 -Yes** | **Total** |  | **Bak Amraek** | **0 - No** | **1 –Yes** | **Total** |
| **0 – No** | 15086.71% | 2313.29% | 173100% |  | **0 – No** | 2689.66% | 310.34% | 29100% |
| **1 -Yes** | 3453.13% | 3046.88% | 64100% |  | **1 -Yes** |  |  |  |
| **Total** | 18477.64% | 5322.36% | 237100% |  | **Total** | 11989.66% | 1910.34% | 29100% |
|  |  |  |  |  |  |  |  |  |  |
| **ti** | **Chak Touch**  | **0 - No** | **1 -Yes** | **Total** |  | **Preaek Norint** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 10491.23% | 108.77% | 114100 |  | **0 – No** | 1055.56% | 844.44% | 18100% |
| **1 -Yes** | 1562.5% | 937.5% | 24100 |  | **1 -Yes** | 1747.22% | 1952.78% | 36100% |
| **Total** | 11986.23% | 1913.77% | 138100 |  | **Total** | 2750.00% | 2750.00% | 54100% |
|  |  |  |  |  |  |  |  |  |  |
| **ti** | **Prean Nil** | **0 - No** | **1 -Yes** | **Total** |  | **Rumchey** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 888.89% | 111.11% | 9100% |  | **0 – No** | 266.67% | 133.33% | 3100% |
| **1 -Yes** | 133.33% | 1966.67% | 3100% |  | **1 -Yes** | 1100.0% | 00.00% | 1100% |
| **Total** | 975.00% | 325.00% | 12100% |  | **Total** | 375.00% | 125.00% | 4100% |

### VI.III.II: Hypotension

Table 22 presents the results for hypotension. At the sample level, 76.3 per cent of people with normal blood pressure remained normal in the next period with 23.7 per cent becoming hypotensive. Those that were hypotensive had a 51.5 per cent chance of having normal blood pressure in the next period. In absolute numbers, this compares to 40 people becoming hypotensive with 35 returning to normal blood pressure. This indicates **a net increase in hypotension** particularly with a high number remaining hypotensive; there is a high prevalence and incidence of hypotension in the surveyed communities. **This suggests that hypotension is more of an issue than hypertension in terms of the absolute and relative number of people becoming hypotensive and remaining hypotensive.**

At the community level, notable findings are again found in Chak Touch where 51 per cent of hypotension cases had normal blood pressure in the next period against 39 per cent becoming hypotensive. **This suggests rising numbers of hypotensive cases for Chak Touch where hypotension is an increasing problem in this community. Interesting, hypotension is not significant in other communities.** In Bak Amraek there is a significant fall in the prevalence of hypotension with over three quarters of cases having normal blood pressure in the next period.

Table 23: Transitional Probabilities of Hypotension at the sample and community levels.

|  |  |  |  |
| --- | --- | --- | --- |
| **ti** | **ti+1** |  | **ti+1** |
| **Sample** | **0 - No** | **1 -Yes** | **Total** |  | **Bak Amraek** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 12976.33% | 4023.67% | 169100% |  | **0 – No** | 1785.00% | 315.00% | 20100% |
| **1 –Yes** | 3551.47% | 3348.53% | 68100% |  | **1 -Yes** | 777.78% | 222.22% | 9100% |
| **Total** | 16469.20% | 7330.80% | 237100% |  | **Total** | 2482.76% | 517.24% | 29100% |
|  |  |  |  |  |  |  |  |  |  |
| **ti** | **Chak Touch** | **0 - No** | **1 -Yes** | **Total** |  | **Preaek Norint** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 5360.92% | 3439.08% | 87100% |  | **0 – No** | 53100% | 00.00% | 53100% |
| **1 –Yes** | 2650.98% | 2549.02% | 51100% |  | **1 -Yes** | 00.00% | 1100.0% | 1100% |
| **Total** | 7957.25% | 5942.75% | 138100% |  | **Total** | 5398.15% | 11.85% | 54100% |
|  |  |  |  |  |  |  |  |  |  |
| **ti** | **Prean Nil** | **0 - No** | **1 -Yes** | **Total** |  | **Rumchey** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 350.00% | 350.00% | 6100% |  | **0 – No** | 3100.0% |  | 3100% |
| **1 –Yes** | 116.67% | 583.33% | 3100% |  | **1 -Yes** | 1100.0% |  | 1100% |
| **Total** | 433.33% | 866.67% | 12100% |  | **Total** | 4100.0% |  | 4100% |

### VI.III.III: Older People

Next, we introduce demographic characteristics into the analysis to examine the transitional probabilities for older people themselves. For the sample, 14.2 per cent of older people with normal blood pressure were hypertensive in the next period whilst 52.9 per cent of hypertensive cases remained hypertensive. Similarly, 26 per cent of older people with normal blood pressure were hypotensive in the next period whilst 50.9 per cent of those with hypotension remained hypotensive. These results are consistent with the grouped analysis previously discussed.

Due to insufficient observations we only include data for Chak Touch and Preaek Norint. In Chak Touch, 8.3 per cent of older people with normal blood pressure were hypertensive in the next period, whilst 43 per cent of those with hypertension remained hypertensive. 42.5 per cent of older people with normal blood pressure were hypotensive in the next period, whilst half of those with hypotension remained hypotensive. **As with the aggregated analysis, this suggests a high prevalence rate of hypertension in Chak Touch and a high incidence and prevalence of hypotension in older people.** In Preaek Norint, 44.4 per cent of older people with normal blood pressure were hypertensive in the next period, whilst 63 per cent of those with hypertension remained hypertensive. **The incidence and prevalence of hypertension is significant in Preaek Norint.** Similar to all age groups there was no change found in those older people for hypotension.

Table 24: Transitional Probabilities of Hypertension and Hypotension for older people, at the sample and selected community levels.

|  |  |  |  |
| --- | --- | --- | --- |
| **ti** | **ti+1** |  | **ti+1** |
| **Hypertension** | **0 - No** | **1 -Yes** | **Total** |  | **Hypotension** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 12785.81% | 2114.19% | 148100% |  | **0 – No** | 10573.94% | 3726.06% | 142100% |
| **1 -Yes** | 2447.06% | 2752.94% | 51100% |  | **1 -Yes** | 2849.12% | 2950.88% | 57100% |
| **Total** | 15175.88% | 4824.12% | 199100% |  | **Total** | 13366.83% | 6633.17% | 199100% |
|  |  |  |  |  |  |  |  |  |  |
| **ti** | **Chak Touch** | **0 - No** | **1 -Yes** | **Total** |  | **Chak Touch** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 8891.67% | 88.33% | 96100 |  | **0 – No** | 4247.53% | 3142.47% | 73100.0% |
| **1 -Yes** | 1257.14% | 942.86% | 21100 |  | **1 -Yes** | 2250.00% | 2250.00% | 44100.0% |
| **Total** | 10085.47% | 1714.53% | 117100 |  | **Total** | 6454.70% | 5345.30% | 117100.0% |
|  |  |  |  |  |  |  |  |  |  |
| **ti** | **Preaek Norint** | **0 - No** | **1 -Yes** | **Total** |  | **Preaek Norint** | **0 - No** | **1 -Yes** | **Total** |
| **0 – No** | 1055.56% | 844.44% | 18100% |  | **0 – No** | 44100.0% | 00.00% | 44100% |
| **1 -Yes** | 1037.04% | 1762.96% | 27100% |  | **1 -Yes** | 00.00% | 1100.0% | 1100% |
| **Total** | 2044.44% | 2555.56% | 45100% |  | **Total** | 4497.78% | 12.22% | 45100% |

## VI.IV: Education

In addition to focusing on attendance and BP screening, the qualitative research sought to evaluate the educational component of the health camps. Respondents were asked about the subjects they had learnt during the health camps and provide a general explanation of their meaning. It is important to note as previously discussed, there are a total of nine subjects taught during the health camps. The responses are presented in Table XXXX. 15 per cent could articulate four or more subjects, 56 per cent 2 or more, and 82 per cent one or more subjects. Only 17.4 per cent claimed they had not learnt anything. It is important to note that these figures do not control for the number of health camps attended but merely highlight was has been achieved through the educational components. However, **if we compare these results to the high attrition rates previously discussed, this suggests a positive outcome from an educational perspective.**

Table 25: Educational Outcomes from the Health Camps

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subjects** | **Chak Touch** | **Preaek Norint** | **Rumchey** | **Total** | **Cum. Total** |
| **4 +**  | 30.43% | 0.00% | 13.64% | 14.49% | 14.49% |
| **2 - 4**  | 34.78% | 41.67% | 22.73% | 42.03% | 56.52% |
| **1 - 2** | 17.39% | 41.67% | 13.64% | 26.09% | 82.61% |
| **Nothing** | **17.39%** | **16.67%** | **18.18%** | **17.39%** | **-** |

## VI.V: Health Camp Consultation

A further sub-component of the education is behavioural change and what this means for adapting lifestyle and seeking medical consultation. 78.3 per cent of respondents said they adapted their lifestyle from what they had learnt at the health camps. Chak Touch had the highest positive response with 95.7 per cent of respondents adapting positively whilst Preaek Norint and Rumchey had approximately one quarter of respondents not changing their lifestyle following the health camps.

In terms of seeking medical consultation, 45.5 per cent sought further consultation following the health camp. These consultations were expressed for hypertension and other diseases. *One older man (58) from Rumchey did not have her blood pressure checked at the health camp, but did at a private clinic. Her BP was 130/100 and was told he was hypertensive. Thereafter, he sought a consultant that cost him 25,000R ($6.25). Blood pressure was not checked at the health camp due to immediate worry.*

## VI.VI: Summary

This section has reviewed possible approaches to impact analysis and found the following key findings:

1. There is little indication in changes in the mean SBP level suggesting the variation in who attends each health camps averages out any potential changes. By contrast, there has been a significant fall in the mean DBP levels. This fall approaches they hypotension threshold indicating DBP is a key driver in the high prevalence of hypotension rather than SBP.
2. Standard deviation analysis demonstrates the SBP data becomes less spread during the health camps, illustrating the mean provides a useful reference indicator. The DBP standard deviation is consistent at the beginning and end with large variation in the middle of the reference period. However, we find uniformity in the data.
3. Significant variation in hypertensive cases makes prevalence predictions difficult. However, a significant increase in hypotensive prevalence was found.
4. Transitional probability analysis finds stabilisation in the incidence of hypertension, but remains prevalent. By contrast, the incidence and prevalence of hypotension was found high. **This suggests that hypotension is more of an issue than hypertension in terms of the absolute and relative number of people becoming hypotensive and remaining hypotensive.**
5. For older people, there was a low incidence of hypertension but a high prevalence whilst we found a high incidence and prevalence of hypotension was found. This is consistent with the grouped analysis.
6. Hypotension remained a key priority in Chak Touch, with a high incidence of hypotension and a high prevalence with nearly half of those hypotensive remaining hypotensive. **In Preaek Norint, there was a high incidence and prevalence for hypertension** but insignificant for hypotension.

# Section V: Discussion & Recommendations

**To do/questions:**

1. Is there seasonality in the readings? Why are there large differences in numbers attending and having blood pressure taken at different points of the year? To what extent is blood pressure affected by seasonality?
2. Are there dangerous levels of blood pressure? What proportion of different sub-groups are categorised as at dangerous levels?
3. Were all readings taken using analogue readings? What position did people have their readings taken in? Was this consistent across communities and periods?
4. What is the normal consultation rate of having blood pressure checked in Cambodia? This should be every 2 months and hence the project follows MoH guidelines

**Recommendations**

* **Need to consolidate and build existing data and practices over expansion. The inclusion of a few additional variables could strengthen the dataset but it is imperative to not over complicate and keep things simple. This will ensure accurate and robust data collection.**
1. <http://gamapserver.who.int/gho/interactive_charts/ncd/risk_factors/blood_pressure_prevalence/atlas.html> [↑](#footnote-ref-1)
2. Cambodian Journal of Nursing and Midwifery, 51, (14:1) pp:13 [↑](#footnote-ref-2)
3. CJNM. (2012). “High Blood Pressure”. Cambodian Journal of Nursing and Medicine (2012), 51, (14) pp:17. [↑](#footnote-ref-3)
4. Adapted from “Prevalence of non-communicable disease risk factors in Cambodia”. STEPS survey country report, September 2010. Cited by: CJNM. (2012). “High Blood Pressure”. Cambodian Journal of Nursing and Medicine (2012), 51, (14) pp:17. [↑](#footnote-ref-4)
5. Average attendance was 41 in Chak Touch; 35 in Preaek Norint; and 37 in Rumchey during the reference period. [↑](#footnote-ref-5)