

**Report on a Mid-Term Review**  
**of**  
**MoPoTsyo Patient Information Center's**  
**DIABETES INTERVENTION**  
**in 3 urban slums**  
**(period July 2005 until December 2006)**



# Table of contents

Introduction .....	5
The intervention's objectives .....	6
Why were 3 new objectives added ? .....	8
The intervention's objectives reviewed 1 by 1:.....	9
Objective 1: Detection of Diabetes in poor urban communities.....	9
Objective 2: Canceled.....	10
Objective 3: Access to appropriate medical treatment for diabetes .....	11
Objective 4: Learn through MoPoTsyo about diabetes disease.....	14
Objective 5: Patients set personal objectives.....	16
Objective 6: Creating contacts among diabetics from the same area .....	17
Objective 7: Creating an active membership at selected locations.....	17
Objective 8: Measure blood sugar control among participants .....	17
(New) Objective 9: Blood Pressure control.....	20
(New) Objective 10: Establish a trained Peer Educator in each slum .....	21
(New) Objective 11: Review prescriptions .....	21
Other issues: .....	22
overweight patients.....	22
Physical exercise .....	23
Underweight patients.....	23
Effects on disease related expenditure .....	24
Attitude towards the disease .....	24
MoPoTsyo's Resources.....	24
Expenses July 2005 until December 2006.....	24
Cost ratios.....	25
Benefits.....	25
Human Resources July 2005 until December 2006.....	26
Other issues .....	28
Diabetes Complications.....	28
Insulin.....	28
Training materials.....	28
Quality and Cost of Medicines .....	28
Public service .....	29
Migration .....	29
Wealthy people .....	29
Health Insurance .....	29
Cost containment.....	30
Peer Educator role .....	30
Monitoring.....	31
Public Policy.....	31
Conclusion and recommendations.....	32

# Figures & Tables

Figure 1 Map of Phnom Penh Municipality.....	4
Figure 2 A minority receives multiple times HEF support for chronic OutPatient Consultations .....	11
Figure 3 A minority of chronic patients receives multiple times support to purchase medicines .....	13
Figure 4 A minority of chronic patients receives multiple times HEF support to pay for transport.....	13
Figure 5 Percentage of knowledge improvement .....	15
Figure 6 Effects on Blood Sugar categorization 1 .....	19
Figure 7 Effects on blood sugar (categorization 2).....	19
Figure 8 Effects on blood pressure .....	20
Figure 9 Beauty is in the eye of the beholder .....	22
Figure 10 Effects on overweight diabetics.....	23
Table 1 The original log frame .....	6
Table 2 Original Objectives and Results per December 2006 .....	7
Table 3 Three new objectives added.....	8
Table 4 Detection activity and results.....	10
Table 5 Types of Health Equity Fund support.....	11
Table 6 List of knowledge of 17 issues.....	16
Table 7 Effects on blood sugar (categorization 1) .....	18
Table 8 Effects on blood pressure per community.....	20
Table 9 Effect on overweight diabetics.....	23
Table 10 MoPoTsyo Expense categories .....	24
Table 11 Cost ratio overview .....	25
Table 12 Benefit overview (to be filled in when the data become available).....	25
Table 13 Cost reimbursement overview .....	26
Table 14 Human resources.....	27

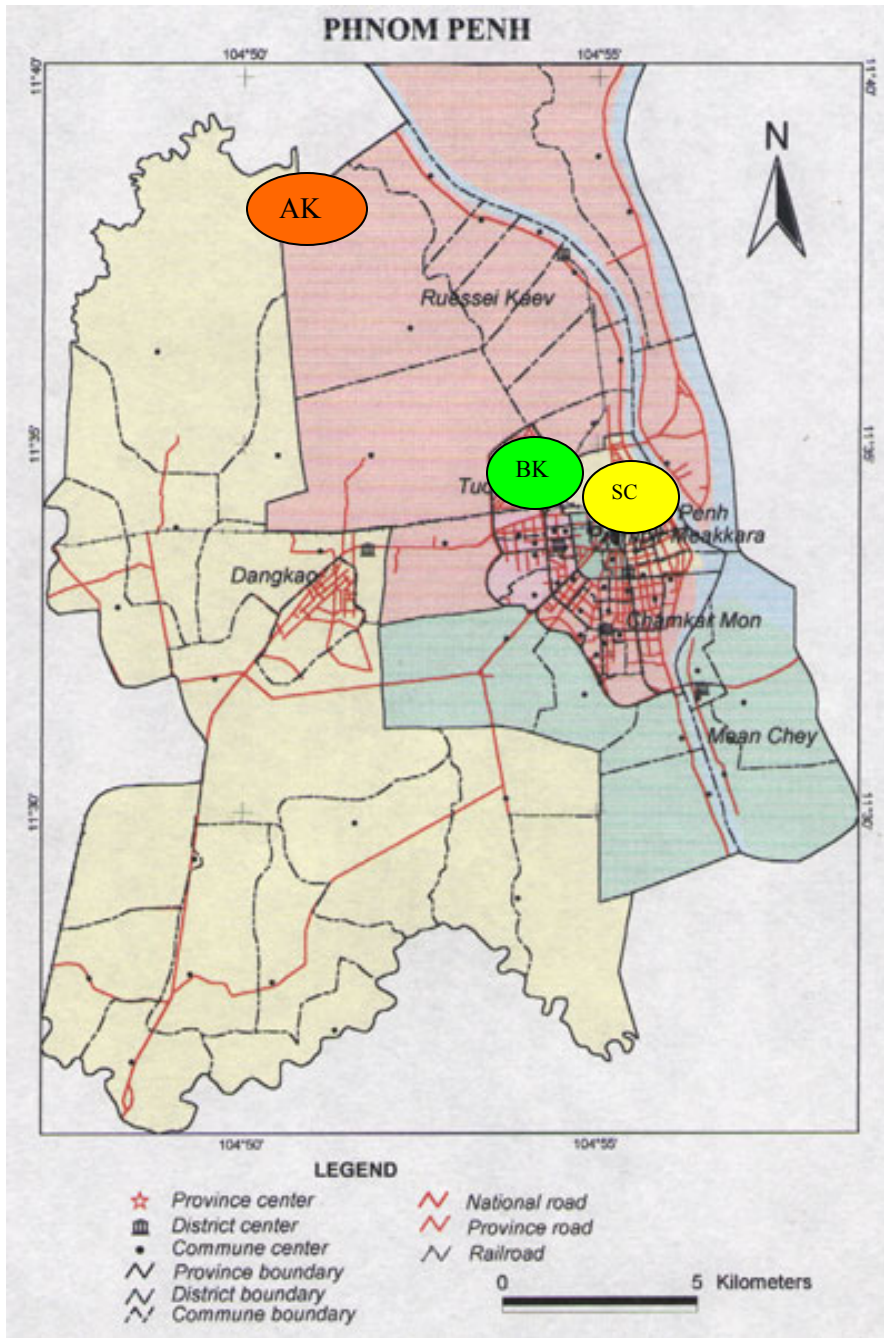


Figure 1 Map of Phnom Penh Municipality

Name of slum area	abbreviation	remarks
Anlong Kangan	AK	resettlement area since 2001
Sras Chork	SC	downtown slum area
Boeungkak 2	BK	downtown slum area

## **Introduction**

This is a report on a mid-term review of MoPoTsyo's work in urban slum communities. The review was done jointly by people working for MoPoTsyo and by independent outsiders. The report is written by Maurits van Pelt, MoPoTsyo's Executive Director, who assumes responsibility for this report's content. It contains a synthesis of findings resulting from both quantitative and qualitative assessments that were carried out to judge whether and how MoPoTsyo's intervention among diabetic people in Phnom Penh's poor urban slum communities is reaching its objectives since the start of the intervention in July 2005. It draws conclusions and makes recommendations. The assessments (in project documents they are referred to as the "6-monthly evaluations") were carried out between July 2006 and September 2006.

The information for the quantitative assessment comes from different sources and was collected through different methods:

the available MoPoTsyo's patient records of the patients in the 3 slum areas: including independent laboratory results, to assess the effects on the beneficiaries' blood sugar, blood pressure, bodyweight, knowledge and skills, as well as reported changes in health expenditures. It was possible to make comparisons of how patients were doing before the intervention and more than 3 months after being registered. Not all registered patients' records were complete.

3 samples of 19 patients were randomly selected for assessment of knowledge and skills in the slum areas. There are 3 slums areas. Therefore a total of 57 patients was interviewed; the interviews were carried out by the Diabetes Program Manager, without presence of the peer educator of the slum area;

In addition, qualitative data were gathered by interviewing in depth 15 purposively selected beneficiaries with questions on how MoPoTsyo's intervention had affected them. These interviews were carried out by researchers, people who are independent from MoPoTsyo.

MoPoTsyo has published two annual reports (2005 and 2006) and one semi annual report (mid 2006), containing a review of past period and the plans for the coming period. These year plans announce changes to the original objectives and strategies. This report, among other things, deals with the motivations underlying the changes to the intervention's original objectives.

Funding: MoPoTsyo would not have been able to carry out these 3 urban interventions if it hadn't received external funding. The 3 largest donors are based in The Netherlands: Het Maagdenhuis, Anne Fransen Fonds and ICCO. They financed the intervention for a period of two and a half years, starting in July 2005 and ending at the end of 2007. Het Maagdenhuis financed part of the operations at Anlong Kangan, a resettlement area outside Phnom Penh at the border of the municipality where people originally living at the downtown slum area Tonle Bassac had been moved in 2002, following a series of slum fires. Anne Fransen Fonds financed part of the intervention at Sras Chork, which lies downtown behind the railway station on the South and East side of the Boeungkak lake. ICCO provided complementary funding, which was used to finance complementary both interventions above and another intervention at Boeungkak II community, which lies at the West of the same Boeungkak lake, but in another administrative area. This intervention started in January 2006.

At the end of 2006, the cut off point for this report, both interventions in Anlong Kangan and Sras Chork have been underway for one year and a half, while the one in Boeungkak II has been running for one year.

## The intervention's objectives

The *original* log frame was changed: certain objectives were dropped and new objectives were added.

**Table 1 The original log frame**

Nr	Objective	Activity	Expected Result	Targets
1	Detection of diabetes among the poor	lab-test for blood sugar voucher distribution in Boeungkak and in Anlong Kangan through the user group members in those areas;	1600 vouchers given out during 2005	400 diabetes patients detected and identified
2	be diagnosed with diabetes	coaching old and new high blood sugar patients towards not for profit providers	400 patients diagnosed with diabetes	400 registered patients with a prescription and holding a patient book
3	get access appropriate medical treatment for diabetes disease	coaching of patients, cooperating with public service providers, not for profit organizations, the ministry of health and the municipal health department, private laboratories etc.;	two well identified user groups of poor diabetes patients who know what they need from the public service providers, who know them and recognizes them, organized by MoPoTsyo as there umbrella organisation	400 patients in a regular follow up
4	Learn through MoPoTsyo about diabetes disease	course development, testing and feedback and improvement	a popular and effective course for poor Cambodians with diabetes, routinely given by people living with diabetes themselves	400 patients positively evaluated
5	Patients setting personal objectives and recording progress	coaching of patients in setting realistic objectives for themselves on subjects which are relevant for their disease control;	recorded progress of patients towards their own objectives	400 cases of patients who still record six months after they started the course
6	Creating contacts among diabetes patients living in the same area;	Course provision and user group facilitation inside the two deprived areas	Fixed hour drop in fixed locations inside or at the border of a deprived community in two areas;	>80% attendance of full course and user group meetings
7	Creation of active membership in the diabetes user group at selected locations	Participatory teaching, involving students in training of others, partial cascade but with strict quality control	Structured volunteer involvement in coaching and in teaching of new patients	2 organized active user groups around diabetes
8	Measure blood sugar control among participants	Quarterly evaluate the enrolled group on the basis of recorded progress plus HbA1C,	Significantly better control when compared with diabetes patients enrolled in not for profit NGO's and with those diabetes patients living in slum areas not covered by the program	Percentage of patients with blood sugar below 200 mg / dl (or equivalent in HbA1C) after one year exceeds 70%

Some of these original objectives, activities, expected results and targets have changed since the start of the program:

**Table 2 Original Objectives and Results per December 2006**

Nr	Original Objective	Changes made	Remarks / reasons	Results in Dec 2006
1	Detection of diabetes among the poor	no change	it works well, the activity is cheap and gives very good results;	259 patients detected among 7984 mostly poor adults (=2531 households) and identified
2	be diagnosed with diabetes	objective was dropped	there is no need for this objective besides detection and access to appropriate care;	
3	get access appropriate medical treatment for diabetes disease	no change	good cooperation with Kossamak National Hospital Partial reimbursement of HbA1c expenses and BG strips by MICADO;	MoPoTsyo's equity fund facilitated 344 times access to health services for the most needy among registered patients.
4	Learn through MoPoTsyo about diabetes disease	no change	Instead of learning at headquarters, learning takes place inside the community via peer educators;	knowledge improved from 28% to 73%;
5	Patients setting personal objectives and recording progress	no change	Besides the Kossamak Patient Book, in which the doctor records progress, only peer educators recorded individual patient progress on behalf of patients; MoPoTsyo did not give an additional patient book besides the Kossamak book which is only used by the Doctor;	patients do not keep their own records but the peer educator records on their behalf;  most patients are aware of their treatment goals in terms of blood sugar and blood pressure and body weight;
6	Creating contacts among diabetes patients living in the same area;	no change	weekly sessions in the community and larger events	3 large events have been organized as well as weekly sessions in each slum
7	Creation of active membership in the diabetes user group at selected locations	no change	peer educators operate are identified as community based educators, coaches, counselors and service providers" to patients; also assistants are identified;	peer educators have found assistants who can help them carry out the daily tasks but these mostly expect some kind of compensation;
8	Measure blood sugar control among participants	no change		HbA1c results and FPG and PPBG results of a large number of patients are available, and show improvements;

In Cambodia this kind of intervention has never been tried before. It is not surprising therefore that during implementation it became clear that the project had to make changes to its strategy: Objective 2 was dropped and 3 new objectives with targets and results were added.

**Table 3 Three new objectives added**

<i>nr</i>	<b>Original Objective</b>	<b>New objectives:</b>	<b>Remarks / reasons</b>	<b>Results in Dec 2006</b>
<i>new 1</i>	<i>was not included</i>	<i>Blood Pressure control</i>	<i>47% of diabetes patients have hypertension;</i>	<i>improvements in management of hypertension;</i>
<i>new 2</i>	<i>was not included</i>	<i>Establish a trained Peer Educator in each slum</i>	<i>the intervention has become “community based”;</i>	<i>Peer Educator is focus person in the community with credibility built up;</i>
<i>new 3</i>	<i>was not included</i>	<i>Review prescription and advise poor diabetics where (and what) to buy as cheaper drugs for diabetes/hypertension</i>	<i>Public service sometimes prescribes expensive brand drugs and too many molecules and too high dosages;</i>	<i>3 out of 5 interviewed persons say that self management is affordable although they have to buy the medicines;</i>

## **Why were 3 new objectives added ?**

**New objective 1)** Of all co-morbidities, hypertension emerged as the most frequently occurring, with half of the patients being hypertensive, with Kossamak actively diagnosing it, treating it and prescribing medicines for it, and the fact that it is often life-style related, MoPoTsyo decided to make it a special objective. Hypertension control among diabetics is both important and feasible. Diabetes is an important risk factor for cardio vascular disease, and hypertension aggravates this risk substantially. Adopting a healthier life style and reducing salt intake reduces blood pressure.

The target for hypertensive diabetic patients that MoPoTsyo set is rigorous:

- less than 130 mm systolic blood pressure and
- less than 80 mm for diastolic blood pressure.

Many of other co-morbidities that patients presented (Tuberculosis, Elephantiasis, Grave’s syndrome, arthritis, Lupus, a diabetes which was due to long term over-use of corticosteroids) have also been dealt with as far as possible, but others have not, such as heart conditions and serious diabetes complications, such as gangrene or renal failure. One patient developed a sulfonylureum allergy, triggered by glibenclamide. She was very poor and received a locally available Meglitinide from MoPoTsyo’s equity fund (Repaglinide) but died suddenly a few months later from heart failure;

**New objective 2)** The intervention changed from “employing diabetic medical staff who teach diabetes patients” to a system in which a “*Diabetic Program Manager supervises diabetic community based peer educators who detect diabetes patients and do peer education among diabetes patients*”. This was done to bring the intervention closer to the home of the patient, to make the program more sustainable, to enhance the community awareness of the program.

**New objective 3)** The third objective that was added is the “drug prescription review”. This became necessary because of overprescription, prescription of brand drugs, a profit margin on the sale of drugs to patients from poor areas, some of whom do not have enough money to pay for food. We want people to eat something else than highly glycemic white rice, but the alternatives are more expensive and



sometimes difficult to get by. Whole rice is not widely available in urban areas and more expensive than white rice. The deep poverty of some patients made it necessary to make the prescription for them as affordable as possible and to coach them where to buy the most cost effective medicines. This will remain necessary as long as anti-diabetic medicine and anti-hypertensive is not supplied through the public health services to chronic patients.

## ***The intervention's objectives reviewed 1 by 1:***

### **Objective 1: Detection of Diabetes in poor urban communities**

Active detection among population is not something that is routinely done in developed countries. The reason is that there is a lack of evidence on benefits of starting treatment early, or at least those benefits are controversial<sup>1</sup>. The cost-effectiveness of active diabetes detection when compared with “doing nothing” in developed countries has not been demonstrated, so health authorities are reluctant to invest resources in this type of preventive activity. In many of the developed countries it may be cheaper to wait until people notice themselves that something is wrong (diabetes symptoms) than to pay for screening of the universal population. This is different when they target specific sub groups, such people with hypertension.

In Cambodia's slum areas the situation is very different from developed countries: many people feel sick but do not go to see a doctor. MoPoTsyo's intervention in the poor areas showed that more than 70% of the people with positive urine glucose reported that they knew they were sick. Of this group again more than 70% had *not gone to see a doctor*. Only 30% of all the people with diabetes detected in the slum did not know something was wrong. The active detection is therefore reaching a segment of the population who, had they been living in a developed country with a reasonable health system, would already have been seen by a skilled physician, been given appropriate advice and been put on a good treatment. For this group of patients and their family members MoPoTsyo has made a real difference with its detection activities.

Active detection was part of the strategy to help build credibility of the peer educators in the community. In the beginning the credibility of lay diabetic persons as peer educators was very low, but thanks to improvement in health of known sick people in the community, their credibility was rapidly strengthened.

The costs related to the active detection have remained low. US 0,97 per screened adult (7984 adults screened), resulting in detecting and registering 259 patients. If we calculate the costs per detected patient: MoPoTsyo spent \$ 30 per detected patient on urine strips and on incentives for the peer educators as it detected 259 diabetics among a beneficiary household-population of almost 15.000 inhabitants (which holds the 7984 self-testing adults) between the start of the intervention in July 2005 and December 2006. Besides detecting diabetes disease among these people, MoPoTsyo's peer educators also measured the blood pressure among diabetics.

Since the start of the intervention, MoPoTsyo's peer educators visited each household in their slum community to talk about diabetes, solicit interest and create awareness of the disease. Per December 2006, a total of 7984 people had received a urine strip with an explanation from MoPoTsyo's Peer Educators on how they can find out if they have glucose in their urine or not. We are not sure if we can assume that the

---

<sup>1</sup> See for example <http://www.ahrq.gov/clinic/3rduspstf/diabsr/diabcost.htm>

(7984-259)=7725 non diabetics have learned that, if they get diabetes in the future, or the disease symptoms, they can contact the diabetes peer educator in their community. It needs to be measured through a survey among the non diabetics living in the area, if they “got the message” or not. If they understood it and can remember it, the intervention likely has a protective effect for them for years to come. The children may not have learned or understood the messages, as they were directed at the adults. However, children are indirectly protected because their parents can remain productive instead of becoming disabled by the disease.

**Table 4 Detection activity and results**

	<b>Sras Chork</b>	<b>Anlong Kangan</b>	<b>Boeungkak II</b>	<b>Total</b>
Total people received urine strip one time	3377	2884	1723	7984
Total households visited	1080	1012	439	2531
Total population beneficiary	6372	5971	2590	14933
Total diabetics detected	91	89	79	259
Total diabetics with hypertension detected	31	42	49	122

In the original proposal, it was planned to confirm “diabetes” by a laboratory test at a private laboratory, located not far from the slum area, with a voucher scheme. This was done during a couple of months but with community based peer educators, they could carry out these Fasting Blood Glucose tests more conveniently and cheaper. So the voucher scheme was abandoned.

## **Objective 2: Canceled**

This objective should not have been there in the first place, as it does not add much between objective one and objective three. Moreover, many patients should first try to improve their high blood sugar with diet and exercise, before it becomes necessary for them to go to see the Doctor and get a prescription for medication. The peer educator system saves opportunity cost, transport cost and health expenditures for this category of diabetes patients. In fact they are detected and “diagnosed” by peer educators, who will refer them only to the Hospital if the life style changes are not enough to bring the glucose levels and hypertension levels down to the target levels. This category of patients benefits from the peer educator’s presence in the community, because it is the peer educator who detects them and teaches them how to avoid diabetes and its complications. There is a risk that, because of a peer educator who is not medically trained and only gives life style advice, people with “another disease” delay their visit to a doctor. This risk needs to be managed by training of peer educators.

### Objective 3: Access to appropriate medical treatment for diabetes

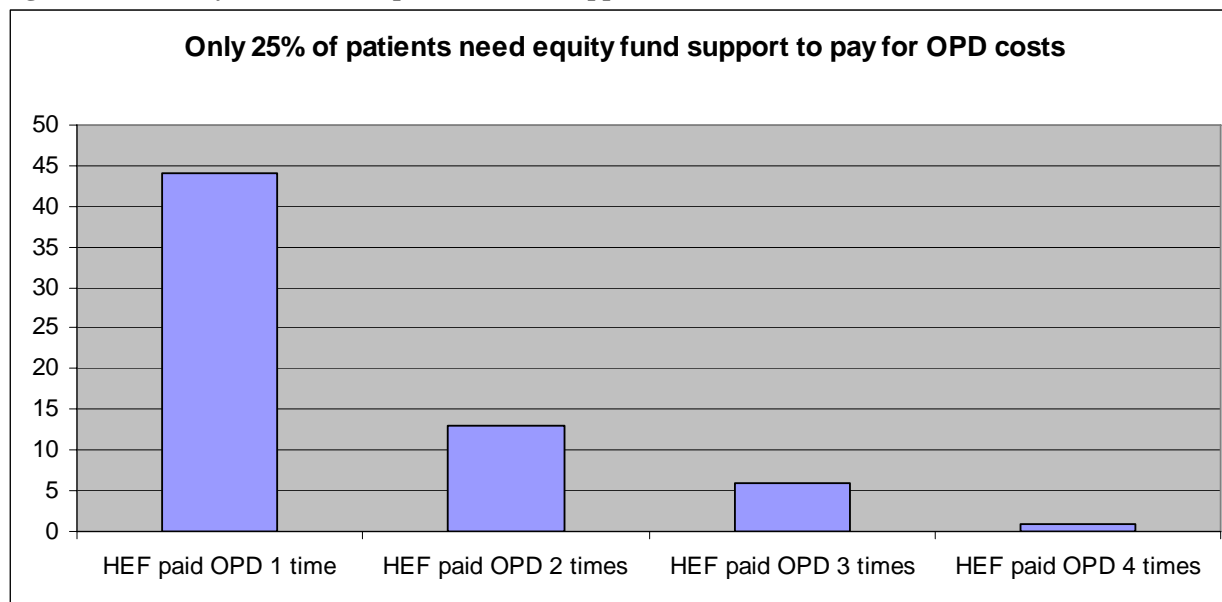
MoPoTsyo works in partnership with Kossamak Hospital and its supporting NGO MICADO to facilitate access to diabetes service for poor people. At Kossamak, the patients detected by MoPoTsyo can be officially diagnosed, get registered and get access to appropriate services. Kossamak is the preferred institution for diabetes treatment. The other sites (Center of Hope provides good quality and free medicine but a lottery system complicates access) are either not accessible or more expensive. Many patients are not just sick but also poor when they register. During the 2006 MoPoTsyo facilitated 344 times access to services for the registered 259 patients. “Facilitating” meant that MoPoTsyo’s Health Equity Fund (HEF) paid or contributed to the costs of OutPatient Services (OPD), the costs of buying anti diabetic/hypertensive medicine, or the costs of transportation for the most needy among the patients from the slum areas. Only a minority of patients needed MoPoTsyo’s HEF to help them financially, but most appreciated the assistance of the peer educator to access the services:

**Table 5 Types of Health Equity Fund support**

Type of HEF support during 2006 to diabetes patients from 3 slum areas	average cost of HEF support per patient per time the HEF assisted a poor patient
Outpatient Service at Kossamak	\$ 6.26
Co-payments for medicines	\$ 3.36
Transport	\$ 1.26

Patients’ dependency on MoPoTsyo becomes less over time, as can be concluded from the graphs below:

**Figure 2 A minority receives multiple times HEF support for chronic OutPatient Consultations**



Among 259 registered patients at MoPoTsyo, there are 52 who are registered at Center of Hope, so they would not need to benefit from equity funding. The costs of glycated hemoglobin testing at Kossamak were paid for by MoPoTsyo on behalf of the patients and booked under the Equity Fund. In fact, HbA1c testing is not strictly necessary, as people can be controlled with less expensive glucose testing methods;

The equity fund dependency rate (number of registered diabetics having benefited from the equity fund during 2006 divided by number of registered diabetics during 2006) is rather low: 25%. While 75% of registered patients did not get financial support from the HEF, very small numbers get almost continuously assistance. Most patients among the 25% who have received a HEF benefit, got it only once. The number of people who are continuously receiving equity fund support is very small. Insulin users are – of course – overrepresented in this group, but still half of them find a way to support them selves.

The normal pattern is that peer educators first try to make people bring their blood glucose under control through life style changes, and only if that doesn't work, they facilitate access to Diabetes service at Kossamak Hospital. That first contact is often paid for by the equity fund. Once patients have their prescription for oral medication, most of them can afford to buy these medicines at the local pharmacy close to slum area where cheap generics are sold to registered patients.

MoPoTsyo does not keep complete records on which of 259 registered patients are prescribed medication for diabetes disease. Also, it is unknown how many of those, who are prescribed medication, are indeed taking the medication. There are no records of the reasons why people are not adhering to prescribed treatment. Peer Educators report that some patients say they cannot afford to pay medicine but they are seen drinking, smoking and playing cards.

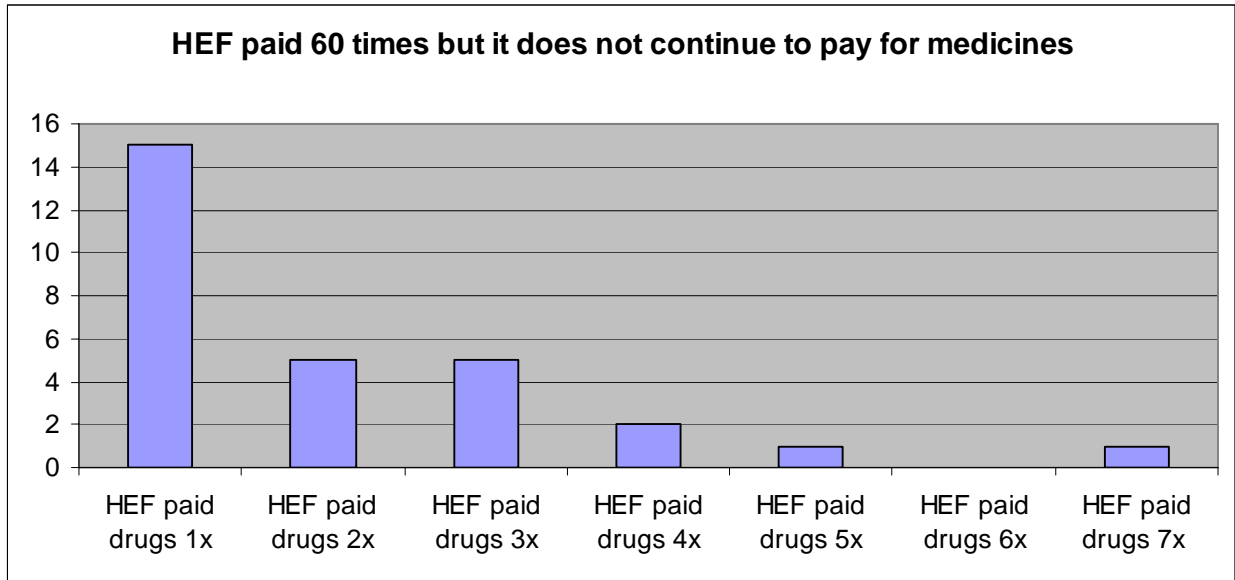
For a minority of diabetics, lifestyle change is the only appropriate treatment that is necessary. The Peer Educators have been effective in helping people adopt and maintain the necessary life style changes. The Peer educators tell these people that they are becoming diabetic unless they undertake something to change their lifestyle. In cases that life style changes do not produce the desired effects, the patient is recommended to seek medical care. In most cases, such as when blood sugar is very high, the patient is young, there is hypertension or other comorbidities the peer educator refers him immediately to Kossamak Hospital without first trying the life style changes.

Not all people who were detected with diabetes had to go or wanted to go to see the qualified physician at Kossamak National Hospital. There were multiple reasons :

- Already under treatment of Center of Hope (52 patients)
- Already under treatment elsewhere
- Should go but unwilling to go
- Should go but patient disappeared
- Applied life style changes made diabetes symptoms disappear;

Almost all the people with diabetes who registered with MoPoTsyo, and who are under treatment in other places than Center of Hope, decided to switch to Kossamak for service provision. The Peer Educators think that the most important reason is the costs, related to service or to transportation. All the other providers, except the Center of Hope and the MSF Belgium clinics in Takeo and Siem Reap, are more expensive. By attending the service at Kossamak, the patients obtain the official prescription with which they can start to buy themselves the affordable medicines at the 2 pharmacies from which MoPoTsyo recommends them to buy. For many of the patients from poor communities, it is not affordable to buy their medicine every month at Kossamak, but it is affordable to buy their medicine at those pharmacies recommended by MoPoTsyo. If it still unaffordable for a patient, MoPoTsyo will provide financial assistance to buy the drugs, most often by co-paying 50% of a prescription which has been revised to the basic drug items only. MoPoTsyo's fund that co-pays is called the "HEF", the Equity Fund, see the graph:

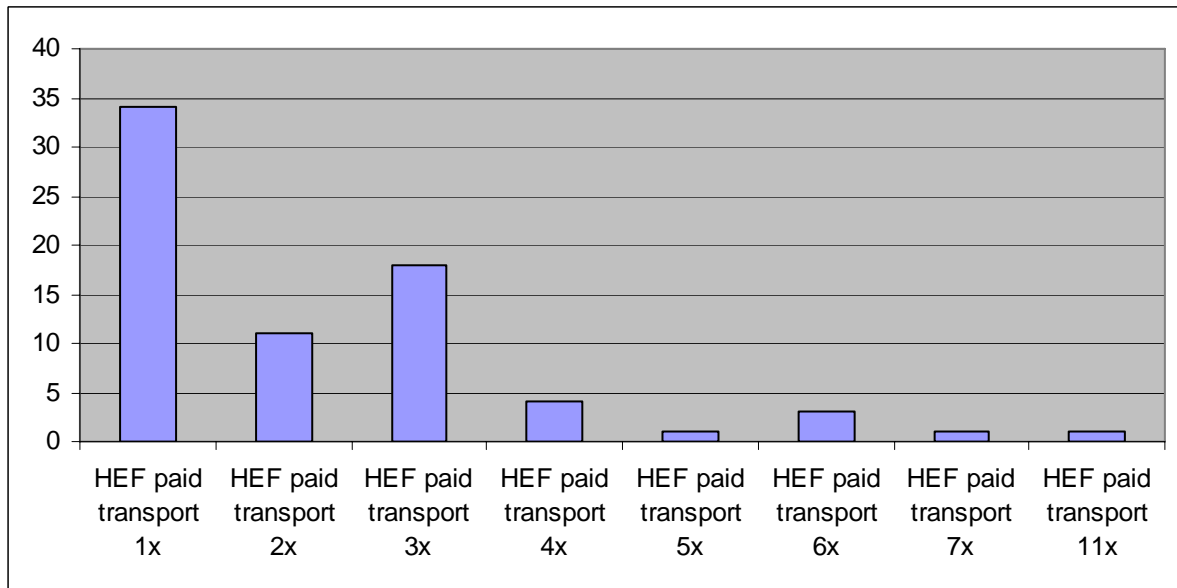
**Figure 3 A minority of chronic patients receives multiple times support to purchase medicines**



The numbers on the Y-axis indicate patients. So the HEF paid drugs only once for 15 patients and it never paid more than 7 times the drugs for a diabetes patient in any one of the slum areas. It is not clear from the records if there is an association with deteriorating health outcomes among patients who do no longer get support from the HEF, or if it can be said that by gradually withdrawing support, MoPoTsyo allows people enough time to become self reliant with regards to their drug purchases.

Another issue is transportation to and from the Diabetes service at Kossamak National Hospital. This is mainly a problem for the people who are living in the resettlement area of Anlong Kangan, at 20 km outside of town. We saw that 96% of all equity fund expenditure on transportation costs is for the diabetic residents of Anlong Kangan slum area. The other 4% are for patients from Sras Chork area.

**Figure 4 A minority of chronic patients receives multiple times HEF support to pay for transport**



The time period covered here is 18 months. The numbers on the Y-axis indicate patients. It shows that MoPoTsyo paid transportation 11 times for one patient, but it paid just once for 34 patients. There is no public transport between the resettlement area and the city where the National Hospital is located. The local health center and the normal referral hospital do not provide diabetes services, nor do they provide any drugs for diabetes. The number of paid transportations is high because it includes the number of trips that patients have made on the request of MoPoTsyo to do the 6-monthly glycated hemoglobin test at Pasteur or at Kossamak. These trips were not strictly essential for the health of patients themselves, but they were important for MoPoTsyo to measure the effect of the intervention on the basis of HbA1c tests. So the amounts that Equity Funds need to spend on transportation of diabetics to and from diabetes services are probably lower than the figure mentioned in the table above (USD 1.26);

#### **Objective 4: Learn through MoPoTsyo about diabetes disease**

Most learning takes place through the direct contact with the peer educator at the patient's home. The patient can ask many questions to understand the mechanism of the disease and how to control it. The peer educator visits the patient many times in his own home. The frequency of the visits to the patient's home varies with 2 main factors:

- is the patient new
- is the blood glucose very high

Once patients are stable and self managing successfully, the need for frequent visits becomes smaller.

The qualitative study shows that people appreciate that the Peer Educator comes to their home. They do not like a peer educator who tells them to come to their house.

The other way to learn is through weekly lessons. MoPoTsyo has developed 6 lessons, dealing with the following 6 themes:

1. biology (heart, arteries, veins and capillaries, blood and blood pressure, oxygen, food, glucose, cells, pancreas, liver, kidneys, urine)
2. diabetes disease: how it affects the biology
3. the balance which is kept between : exercise, food and medicines
4. anti diabetic medicines: the names, the groups, dosages, quality, brands, generics,
5. food: glycemic index, fats, proteins, variation,
6. ways to self measure progress: urine self test, blood glucose fasting and post prandrial, HbA1c, kg, blood pressures;

Each peer educator has been trained in how to teach the basics with regards to the above subjects, both through formal trainings and through training-on-the-job by experienced an peer educator. Each peer educator has had to pass a theoretical exam. This exam has been repeated once for each peer educator. In the exam committee are the Medical Doctor, recruited by MoPoTsyo and the Diabetes Program Manager. In the first exams were the Medical Doctor and the CEO.

The Medical Doctor continues to organize courses for the peer educators, on request of the Diabetes Program Manager and on his own initiative.

The Peer Educators have also been trained in special subjects, such as foot care. The Diabetes Program Manager was trained together with medical staff in a weeklong course organized by the Ministry of Health with foreign technical experts, who specialized in the subject of Diabetes "education". This is a sign that the Ministry may be ready to recognize the peer educator role created by MoPoTsyo. More

discussion is necessary for this, and also more work in drafting proper terms of reference of the Peer Educator in diabetes.

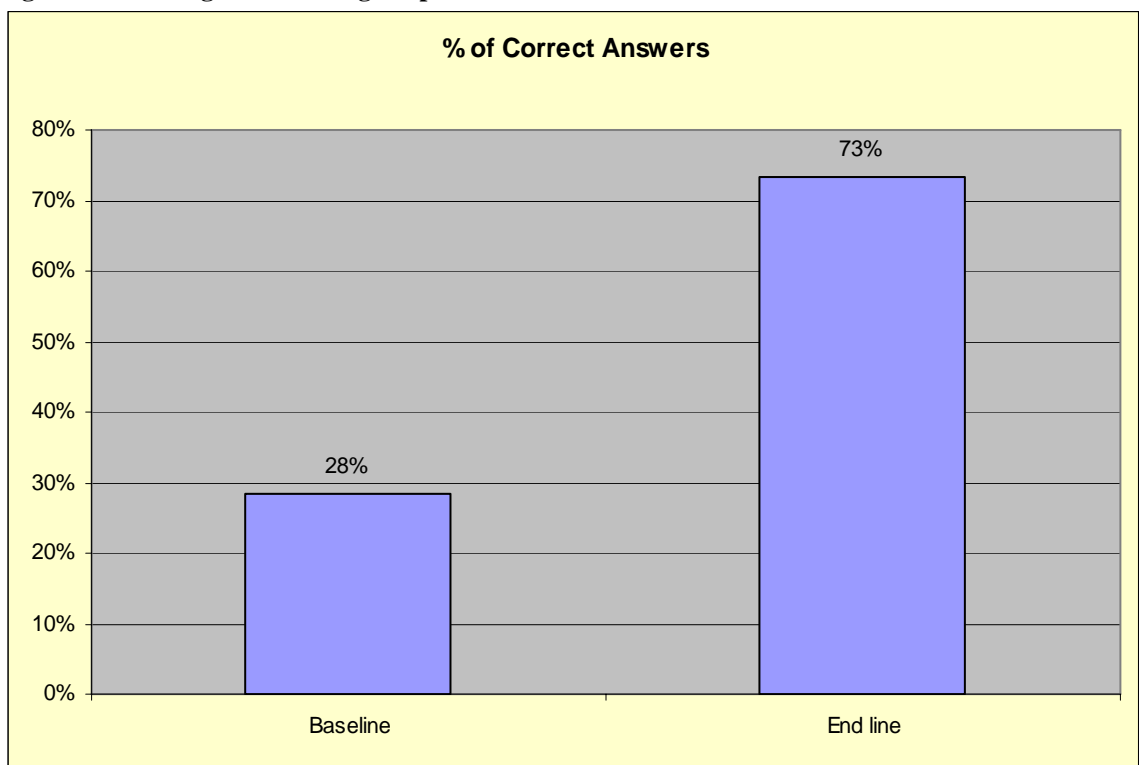
The improvement in knowledge was quantitatively assessed using the following methodology:

Every diabetic person was assessed by the peer educator at the moment of registration using the same assessment form, containing questions assessing the awareness of risks and knowledge with regards to a issues that are dealt with during the 6 lessons and in which the peer educators have been trained and tested.

For the endline a random sample of 19 patients was selected from each of the 3 communities, who were tested with the re-assessment form containing 17 questions. This efficient survey method is called Lot Quality Assurance Sampling. It has an alpha error and beta error of less than 10% which is “good enough” for management purposes.

A comparison of the average re-assessment results of these 3 groups of randomly selected 19 patients with their own assessment results gives the following picture:

**Figure 5 Percentage of knowledge improvement**



The re-assessment was not done by the Peer Educators, but by the Diabetes Program Manager, who is the supervisor of the peer educators. All re-assessments were done by the same person. Below is the list of subjects on which the randomly selected patients' knowledge improvements were tested. The 17 questions in the assessment and re-assessment are the same. The above graph shows the average improvements of the results of three slum areas. It is strange that knowledge can actually also deteriorate as is seen with the first two items. The intervention has probably confused people on those 2 issues, but overall the results are good, even quite impressive.

**Table 6 List of knowledge of 17 issues**

<b>Knowledge with regards to 17 issues</b>	<b>improvement</b>
01 risks to microvascular system, small blood vessels	-9%
02 risks to macrovascular system, arteries	-2%
03 risks to the heart	46%
04 risks to the kidneys	35%
05 risks to the eyes	58%
06 risks to the nervous system	23%
07 risks to extremities	54%
08 wounds that do not heal	61%
09 Can you eat many eggs as you want? (correct answer is "Yes")	67%
10 Can you eat many fish as you want? (correct answer is "Yes")	49%
11 Can you eat beans as you want? (correct answer is "Yes")	61%
12 Can you eat as much rice as you want? (correct answer is "No")	75%
13 Can you eat as much bread as you want? (correct answer is "No")	74%
14 What would be a good Blood Pressure result? (correct answer is less than 130/80)	63%
15 People on picture (obese) look healthy? (correct answer is "not healthy")	33%
16 What is their health problem? correct answer is "they are too fat"	33%
17 Which organ regulate your sugar? correct answers "the pancreas" and or "liver"	39%
<b><i>The average improvement in knowledge among all patients in 3 communities is</i></b>	<b>45%</b>

The degree of knowledge improvement per issue varies enormously as can be seen in the table above. Also, the results per community varied. The method helps to identify what is clear and what is not clearly explained during the lessons.

The information learned through the peer educators, during the lessons and outside lessons is in general very much appreciated by the patients, as appears from the qualitative evaluation in annex. The full text of the qualitative evaluation is in the annex.

### **Objective 5: Patients set personal objectives**

This objective has been hardly pursued, because the peer educator role has appeared. The original idea was that patients would set their own objectives and regularly meet with the provider. The peer educator is recording and doing follow up of the patients instead of the patients themselves. This is understandable in the beginning, because the peer educator is building up his credibility in the community. However, the objective that patients must be able to set personal objectives remains valid and worthy of pursuit. It needs to be addressed as well. MoPoTsyo needs to find a way that patients record their own benchmarks and their own progress. This is challenging given the level of analfabetism in the slums and among poor people.



## **Objective 6: Creating contacts among diabetics from the same area**

### **weekly lessons**

Each of MoPoTsyo's peer educators organize on a fixed day of the week group sessions, during which they teach the lessons mentioned above. These lessons take place at the home of the community based peer educator. So the people from the community get to know each other. These group sessions are also occasions for patients to do a blood glucose test, fasting or post prandial and to measure their blood pressure. They listen to each others results, questions and answers. It is a group consultation session. People can exclaim their surprise about a high glucose level and listen to the question and answers between the peer educator and the diabetes patient. "What did you eat just now ?" etc.

### **large events**

In addition there are irregular group events where everybody comes together in the community. The largest events are up to seventy people. It is an occasion for MoPoTsyo to present itself to the patients, to explain about the organizational goals, about expected changes, clarify misunderstandings, to see video related to diabetes disease, to do a quiz and usually to do a cooking contest with food items that are healthy for people with diabetes.

1 event was organized in Anlong Kangan and in 2 Boeungkak-Sras Chork during the first year.

## **Objective 7: Creating an active membership at selected locations**

This objective was written before the strategy of the community based peer educator had been created (see the new objective added below). Indeed we can consider "peer educators" and their assistant peer educators as "active members" at the selected locations. However, during the first year these peer educators have become real focus persons in their communities. All activities are concentrated in them. Weekly sessions take place at their house in the community, so all diabetics who have been detected come to this one peer educator's house regularly. Instead of every diabetic managing himself 100%, we see that the peer educator starts to become almost like a service provider in the community for the people who are living there. He/she is doing the blood test on the patient, in most cases, instead of allowing the patient to do the blood test on herself. This issue will be addressed in the future to strengthen the self management capacity of the people with diabetes.

## **Objective 8: Measure blood sugar control among participants**

This objective was chosen because MoPoTsyo wanted to measure whether the registered members controlled their blood glucose levels regularly. Once the intervention got underway, the peer educators offered participants the possibility to come to their house in the community once a week to have their blood checked. The result was recorded and transmitted to MoPoTsyo's Manager. Shortly after MoPoTsyo introduced a book for its patients to record their results, Kossamak Hospital introduced a patient book for each patient in which the doctor records the prescription and results of tests at the hospital. Our patients could not write in that book. MoPoTsyo dropped the idea of having patients record their own results, but it commissioned the peer educators to keep a follow up book with the situation and progress of each patient over two pages with all the patients of the community.

The choice of blood glucose test to measure the effect of the intervention has been a long and winding road with a couple of U-turns: Fasting Blood Glucose and Post Prandial Blood glucose tests were regularly done on patients by the peer educators. These data were recorded in the patient dossier. Some patients did not have to go see the Doctor at the Hospital yet, as they were first trying to improve their

blood sugar through diet and exercise. In addition, at the beginning of the intervention, in July 2005, MoPoTsyo paid for some of the patients to do a glycated hemoglobin test at Pasteur Institute. There was no HbA1c available in Cambodia at that time. The glycated hemoglobin test at Pasteur was done on total hemoglobin instead of only the A1c hemoglobin, although that is the internationally standard for marking hemoglobin glycation in diabetes. MoPoTsyo knew about this and decided to use the results thinking that what matters most is to be able to follow the trend in hemoglobin glycation of a patient over time.

However, in January 2006, HbA1c became available at Kossamak and MoPoTsyo decided to switch to the international standard. During the July 2006 evaluation, however, the endline of July with HbA1c was not comparable with baseline total hemoglobin glycation results done at Pasteur. In addition, the total hemoglobin glycation results appeared inconsistent when MoPoTsyo compared results done both at Pasteur (total hemoglobin) and Kossamak (HbA1c). As a consequence, in July 2006, MoPoTsyo decided to throw out the test results of total hemoglobin, and reverted, for its baseline data, to simple post prandial blood glucose results, which had been kept since the beginning, and to use exclusively HbA1c data for the July 2006 endline.

As a result, for the December 2006 quantitative evaluation, there are 123 registered patients of whom MoPoTsyo has both baseline (either post prandial blood glucose or HbA1c) and endline blood glucose data (only HbA1c).

There are two categorizations used by MoPoTsyo to assess the effects of its intervention on the blood sugar. They both show that the intervention is effective. However, categorization method 1 is more controversial than categorization method 2.

**Categorization 1)** The patients have been divided into 3 groups as follows:

Group A with a postprandial bloodsugar <200mg/dl or HbA1c <8.5%

Group B with a postprandial bloodsugar of 200 mg to 300 mg or HbA1c 8.5% to 11.5%

Group C with a postprandial bloodsugar > 300mg or HbA1c > 11.5%

**Table 7 Effects on blood sugar (categorization 1)**

		<b>HbA1c</b>	
		<b>Before MoPoTsyo</b>	<b>After MoPoTsyo</b>
AK	Group A	12	26
	Group B	13	13
	Group C	16	2
BK	Group A	19	32
	Group B	12	14
	Group C	18	3
BB	Group A	14	22
	Group B	9	8
	Group C	10	3
<b>Total:</b>		<b>123</b>	<b>123</b>
Group A=Good		<b>45</b>	<b>80</b>
Group B=Not good enough		<b>34</b>	<b>35</b>
Total:	Group C=Bad	<b>44</b>	<b>8</b>

*HbA1c was first introduced in January 2006 in Cambodia. HbA1c means Glycated Hemoglobin test. Over time glucose attaches itself to a type of hemoglobin called A1c. The test indicates an average level of glucose over the preceding 3 months. All end line data are based on HbA1c, however some of the baseline data were done with other tests and converted to HbA1c values, but doing this is controversial. So the data “before MoPoTsyo” are less robust than the data “After MoPoTsyo”.*

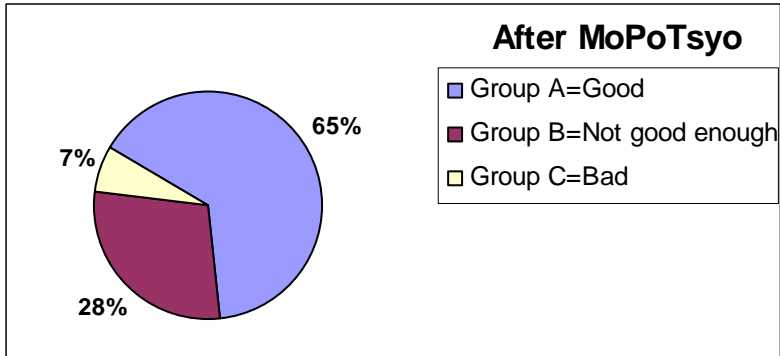
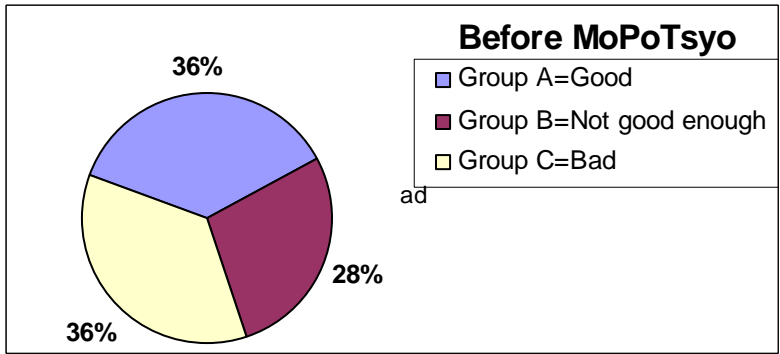


Figure 6 Effects on Blood Sugar categorization 1

The pies in figure 2 on the left show how the patients blood glucose levels improved after at least 3 months registration with MoPoTsyo. These data are from 123 patients, all the data that MoPoTsyo has.

A=Good is HbA1c < 8.5%  
C=Bad is HbA1c ≥ 11.5%

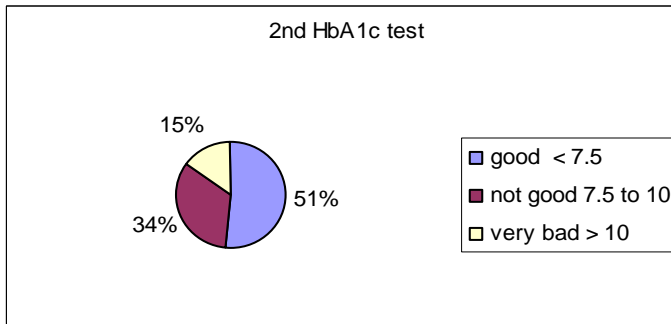
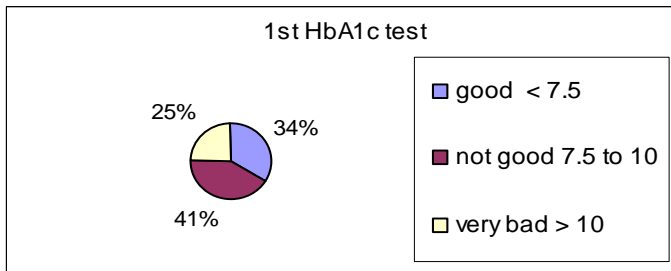
MoPoTsyo has assumed for the baseline, that an HbA1c of 8.5% can be compared with 200 mg/dl of post prandial blood glucose.

64% hyperglycemic diabetics at baseline reduces to 35% hyper-glycemic diabetics at the endline.

This method is not without controversy so a more rigorous methodology is presented below in **Categorization 2)**

**Categorization 2)** The 73 patients of which we have these HbA1c data were divided into 3 groups but using *more severe criteria* for good blood glucose control and no conversions are made.

Figure 7 Effects on blood sugar (categorization 2)



Many of MoPoTsyo's patients, when they undergo the first HbA1c test, have been trying for several weeks or months to lower their blood sugars through life style changes.

Even when stricter HbA1c criteria are adopted, there is clear improvement in blood sugar control : 66% hyperglycemic diabetics reduces to 49% hyperglycemia during the 2<sup>nd</sup> HbA1c test at Kossamak.

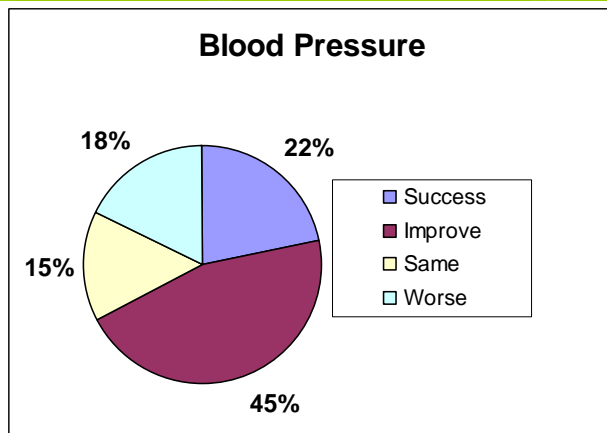
All patients are from poor communities. Many do not have enough money to buy medicines or to buy the more expensive, healthier, nutrition, such as beans to substitute for highly glycemic white rice.

## (New) Objective 9: Blood Pressure control

Soon after the intervention started it was found that a large number of people with diabetes had hypertension. The proportion of diabetics with hypertension grew from one quarter to more than half all registered members. The peer educators were trained and equipped to measure blood pressure regularly. The target blood pressure was set at 130/80 mm for people with diabetes. Every diabetic person with hypertension was given appropriate life style advice (including reductions of salt intake despite the scientific controversy), losing weight for those who need to lose weight, and increase physical activity for those who did not exercise enough (less than half an hour per day). The peer educators record weekly blood pressure of all the persons who are hypertensive (about half of all registered members) in the peer educator follow up book.

**Table 8 Effects on blood pressure per community**

Blood Pressure		
AK	Success	4
	Improve	4
	Same	1
	Worse	7
BK	Success	6
	Improve	16
	Same	8
	Worse	4
BB	Success	6
	Improve	13
	Same	2
	Worse	2
Total:		<b>73</b>
	Success	16
	Improve	33
	Same	11
Total:	Worse	13



**Figure 8 Effects on blood pressure**

The average values of 3 measurements when the hypertensive diabetic registers is taken as baseline to compare it with the average value of 3 measurements during the month of the endline, i.e. December 2006.

There is at least a period of 3 months between the month of baseline and the month of endline measurements.

AK = Anlong Kangan  
BK = Sras Chork  
BB = Boeungkak II

**Success** means that both Systolic < 130mm AND Diastolic < 80 mm ;

**Improved** means that either both Systolic and Diastolic blood pressures or one of the two have improved more than 5 mm;

**Same** means that the change is less than 5 mm

**Worse** means that the deterioration is more than 5 mm

Peer Educators use the same type of OMRON machine on batteries to measure the blood pressure;

The way blood pressure is measured is not standardized. People are sometimes sitting on a chair with their arm on a table, but other times they are lying down. Often blood pressure is measured in places where there is no chair or table. Most patients in poor communities do not have a chair and or table in their home, but they always have a possibility to lie down.

### **(New) Objective 10: Establish a trained Peer Educator in each slum**

In each of the 3 locations, there is one person selected with diabetes who is willing and able to become Peer Educator. The candidate peer educator first learns how to self manage. After that the training of the peer educator starts by accompanying an experienced peer educator in that person's community and during visits to the hospital, when the peer educator accompanies poor patients. There are also formal trainings of peer educators organized by MoPoTsyo. At the end of the training, the candidate peer educator has to pass an exam. One of four peer educators failed the exam and decided that he could not master the job because his memory was not good enough. Once back in his own community, the peer educator work starts. He or she then starts to detect the other people with diabetes in the community and selects suitable assistants. The Peer Educator organizes weekly sessions for diabetic people at his/her own home and, besides giving information, does counseling of patients with regards to life style changes. If needed, he facilitates that registered patients go to consult an appropriate diabetes service provider, at Kossamak National Hospital. Over time, the peer educator can identify assistants.

There is not yet a system to divide the workload between the Chief Peer Educator and the assistants. There is tendency to divide the work "geographically" but this is being discouraged. This is something that needs to be worked out more in detail in the future in particular in areas where there are more than one hundred patients registered. This will happen in health center areas with more than 6000 people, that is majority of health centers.

### **(New) Objective 11: Review prescriptions**

Soon after the intervention started, MoPoTsyo was confronted with the problem that poor patients received a prescription with high dosages of anti diabetic medicines. MoPoTsyo focuses on life style advice, so if people start to follow the advice, many of them need less medicine than prescribed. For everybody who is diabetic, but in particular for poor people without money to pay for medicines, effective life style advice is useful. After consulting with Kossamak, MoPoTsyo told the patients who showed signs of hypoglycemia to reduce the intake of anti diabetic medicines. Other patients were too poor to come every month to Kossamak to see the doctor and buy their medicines there.

**Cost:** The need for protection of chronic patients is larger and more varied than initially thought. It is not enough to simply educate patients about their disease and tell them to which provider they can go to seek appropriate care. Too many poor people would not be able to adhere to the treatment. Poor patients are in a fragile economic situation. Price variations can mean the difference between adherence to medical treatment or its abandonment. Many patients face regularly the choice to buy food or medicines. Because of this, there is an important role for an institution like MoPoTsyo to look at the whole case including the prescription of a poor patient to see if it is feasible for the patient, given his/her socio economic situation to adhere. If it is not feasible, MoPoTsyo counsels the patient about which medicines are the essential ones, and which ones are less essential. As long as medicines for chronic patients are not provided for free, this will remain necessary.

The medicines at Kossamak are sold to the patients with a profit margin. MoPoTsyo identified cheaper alternatives of the same molecules made in Thailand or Korea. It is gathering information about their quality. MoPoTsyo has made contracts with private pharmacies located in the neighborhood of the slum areas, so they agree to sell these cheaper generic versions with a profit margin of only 10% to the patients

who present themselves with the official doctor's prescription. These pharmacies agree to sign because MoPoTsyo donates a start-up stock of the selected drug, which they replenish out of the sales.

This way, the patient saves money:

- Payments to the Service Provider: Kossamak's regular patients have to come every month for consultation and buy the medicines;
- Patient saves opportunity cost because less time is lost;
- Patient saves travel cost to the hospital, which is further away than the local pharmacy;

MoPoTsyo has not been organizing drug quality tests, but it has obtained the quality specifications of these medicines provided by the importers to the Ministry of Health.

## **Other issues:**

### **overweight patients**

MoPoTsyo measured length and monthly weight in kg of patients. BMI 23 was chosen as the starting point for overweight. With this criteria, about half of patients qualified as overweight. Weight loss was not an objective. But the weight development was recorded. Among 91 patients with a BMI of more than 23, only a minority (39) lost weight while they were registered at MoPoTsyo. *One third* of the overweight diabetic membership deteriorated.

MoPoTsyo's experience shows that it is a special challenge to make people lose weight in the slum communities. It requires not just activities for the patient but also for the social environment.

**Figure 9 Beauty is in the eye of the beholder**



While in most of the developed world, people nowadays idealize slim or athletic muscular figures, khmer people are possibly still recovering from decades of scarcity including starvation. The extra paddings including beer bellies are seen as signs of wealth, health and happiness instead of an irresponsible life style that shortens life expectancy.

Cambodian actors and actresses also look similar to the smiling potbellied Daddy on the left...

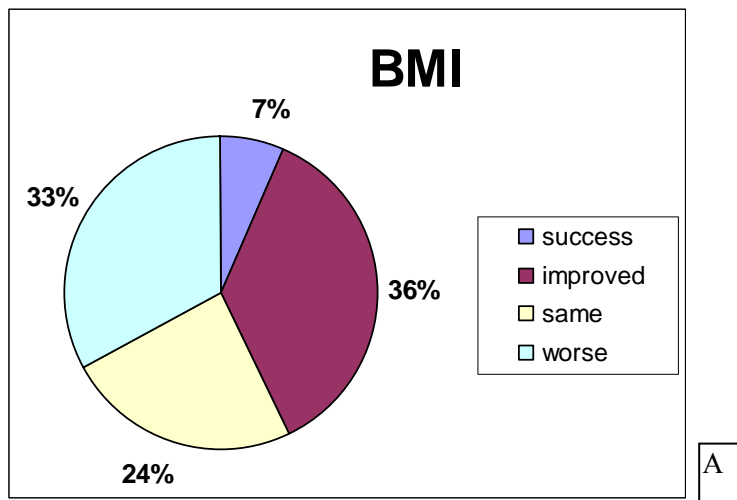
The result of it is that the patient's environment discourages the patient to lose weight. People may think someone has AIDS if he or she has lost a few kilo's. Weight loss is, unsurprisingly in Cambodia, often seen as a sign of a serious health problem and possible infectious disease.

Although the mentality is beginning to change among well educated people, most Cambodians continue to prefer overweight and like to see their bones and muscles covered under bodyfat.

**Table 9 Effect on overweight diabetics**

	success	3
	improved	12
	same	8
AK	worse	11
	success	2
	improved	12
	same	6
BK	worse	11
	success	1
	improved	9
	same	8
BB	worse	8
Total:		<b>91</b>
	success	6
	improved	33
	same	22
Total:	worse	30

**Figure 10 Effects on overweight diabetics**



### ***Physical exercise***

The peer educators pay attention to the need to exercise and remain physically active. Patients respond and many report to have benefits from it. The qualitative study produced a mixed picture of the exercise. There was no question related to increase of physical exercise among the randomly sampled groups of 19 patients in each slum. So we do not have quantitative data on whether the patients have increased their physical activity as result of the intervention.

### ***Underweight patients***

A small minority of patients was underweight, with BMI < 18.5. These patients could all improve their body weight.

## ***Effects on disease related expenditure***

From the qualitative study it appears that many patients appreciate the savings they can make as a result of the intervention. Many people with diabetes spend less on the disease and they say that this is directly related to MoPoTsyo’s intervention. It is very difficult to assess quantitatively how much people actually save in terms of health related expenditure as a result of MoPoTsyo’s intervention. By randomly assessing whether patients report savings when compared to the time before MoPoTsyo, or not, the effects on disease related expenditure can be reliably assessed. For that however, a question should have been included in the interview of 19 randomly sampled patients per slum area, but no such question was included.

## ***Attitude towards the disease***

The qualitative study showed that people who were afraid of diabetes disease have come to terms with it: they learned to control it and are no longer fearful. There is increased sense of control, although people do not always follow all the restrictions, they feel they can influence the disease themselves.

The issue of “feeling of being in control” was also quantitatively assessed using the 19 randomly sampled patient in each of the 3 slums. The result was that 4 out of 5 said that they felt more in control of their disease (82%).

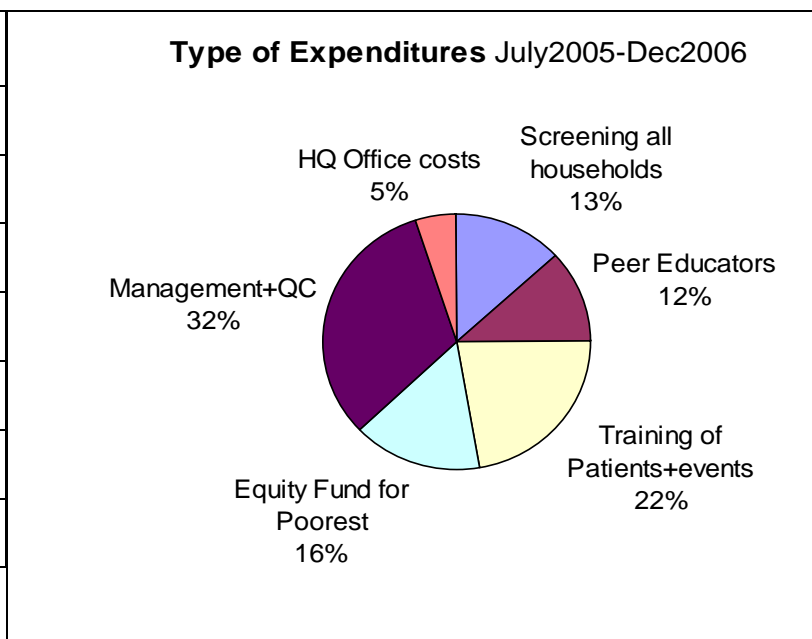
In earlier research (end of 2005), done by independent social researchers who conducted focus group discussions with diabetes people enrolled in the MoPoTsyo program those not enrolled in MoPoTsyo, but also being treated at Kossamak Hospital, the group enrolled in the MoPoTsyo program felt more in control compared with the other group.

## ***MoPoTsyo’s Resources***

### **Expenses July 2005 until December 2006**

**Table 10 MoPoTsyo Expense categories**

<b>Expense category</b>	<b>USD</b>
Screening all households	4,145
Peer Educators	3,657
Training of Patients+events	6,980
Equity Fund for Poorest	4,853
Management + Quality Control	10,042
Headquarter office cost	1,563
<b>Total</b>	<b>31,240</b>





The majority of equity fund expenses were for glycosylated hemoglobin tests at Pasteur and at Kossamak Hospital and are not strictly necessary as part of “access to basic health services”. So equity fund expenses may be lower in future projects if HbA1c is eliminated from the standard package.

MoPoTsyo has also paid for health services of some poor diabetic people who do not live in the intervention areas and these expenses were also included in the above table.

## Cost ratios

**Table 11 Cost ratio overview**

<b>activity:</b>	<b>calculation</b>	<b>USD</b>
detection	(cost of urine strips + peer educator cost)/numbers of diabetes patients registered	30
training in self management +coaching of patients	(costs of equipment and consumables + peer educators) / numbers of diabetes patients registered	41
equity fund <sup>2</sup>	cost of user fees, transport, medicines / numbers of diabetes patients registered	19
management+office	cost of head quarter + Management + QC / number of diabetes patients registered	45
<b>Total MoPoTsyo</b>	<b>all costs divided by all registered patients</b>	<b>135</b>

## Benefits

MoPoTsyo plans to do a cost benefit analysis of the intervention. The list of benefits below is a preliminary one so it can serve as a basis for review and valuation by a CBA expert.

**Table 12 Benefit overview (to be filled in when the data become available)**

<b>Benefits</b>
patient saved health expenditures
patient saved opportunity costs (less time lost on seeking health care)
patient saved transportation costs
maintained productivity of income earners
gained years of child education
reduced borrowing against interest
households protected against poverty
households enabled to emerge from poverty
other household members adopting healthier lifestyle

<sup>2</sup> equity funds are third party civil society organisations who reduce financial and other barriers to appropriate health services for poor people; MoPoTsyo acts as equity fund, mostly temporarily, for poor diabetic people until they can manage themselves;

The benefits emerge at different levels:

- the patient
- the household
- children of the household who are aware how to deal with diabetes in case they become diabetic
- other community members
- society (the slum society, wider society due to urban rural migration)
- during the period of the intervention (2 years), and after the intervention;

It will be difficult to put “ numbers” to each of these benefits, but it would be wrong to omit these numbers, because these benefits are important to reduce poverty.

## Human Resources July 2005 until December 2006

At the community level, MoPoTsyo encourages residents with diabetes to assume a role in the intervention and carry out the planned activities for their community members. MoPoTsyo does not hire people, but reimburses their costs. Costs that Peer Educators incur are typically transportation costs, but also opportunity costs spending time with patients instead of earning income. If a peer educator, as a motodoub, earns around 10.000 riels per day to feed his family, but instead spends half a day at the hospital with a patient, he would lose half a day earnings, which would make it impossible for him to perform the role. The level of the reimbursement for opportunity cost is set as low as possible, so that the time spent provides no profit and no loss. Below is detailed table showing the details of how the reimbursement levels have been set.

The cost reimbursement schedule which has evolved per December 2006 and which reimbursed 3 peer educators for their activities shows that they each have received USD 500 on average over the period of a year, coaching on average 86 patients, which comes down to USD 5.8 per patient;

**Table 13 Cost reimbursement overview**

Description	US\$
Urine Screening	103
New positive patient found	200
Measuring Blood Pressure	79
Measuring Blood Glucose	64
Urine test	127
Weighing the patient	29
Waist	4
Hip	4
Travel to MoPoTsyo office	227
Coaching patient to get service at Kossamak	244
Vehicle parking at hospital	13
Training of patients in community	190
Monthly Vehicle maintenance	155
Assessment of Patient	61
<b>Total</b>	<b>1,499</b>

USD1 = 4000 Riels

MoPoTsyo regularly adapts the system to obtain the desired “outputs”. Twice yearly health outcomes are evaluated. When the results are known, awards are given to mark relative performances of peer educators. MoPoTsyo intends to keep the community member involvement at the grass roots level from becoming a profitable business.

During the intervention period of 18 months there have been 2 full time staff and 4 part timers;

**Table 14 Human resources**

<b>MoPoTsyo Head Quarter</b>	<b>total person months</b>	<b>total amount</b>	<b>monthly</b>
salaries full timers (2 persons)	33	\$ 4,600	\$ 139
salaries part timers (4 persons)	22	\$ 1,845	\$ 83

## **Other issues**

### **Diabetes Complications**

Hypertension is checked and controlled by the intervention. If a patient, despite life style adaptations and medication does not descend below 130/80 mm, a second visit to the specialist is necessary.

In 2006, the peer educators received a one-day training at the Khean Khleang Rehabilitation Center how to deal with foot ulcers. In every community diabetics occasionally present with foot ulcers. With their new skills, the peer educators have been able to enhance their credibility inside the communities. They pride themselves in being able to assist patients heal their foot ulcers.

MoPoTsyo has not yet organized eye exams for the diabetes patients. It will be done in the future for patients who have had diabetes for 5 years or more.

Not every patient who is on metformine has had the creatinine level checked;

Cholesterol levels are not routinely checked.

### **Insulin**

Insulin requiring Diabetes living in the target zones get assistance from MoPoTsyo if they cannot afford to buy their insulin and as long as they cannot receive their insulin through another system. MoPoTsyo bought insulin for 8 out of 19 people needing insulin. Providers of free insulin are Center of Hope and Kantha Bopha for children. All others, including public services, sell the insulin to the patient, sometimes at a subsidized price. The prices at which types of insulin is sold have been fluctuating wildly from USD 5 per pen to USD 25, making insulin users switch suddenly from one type of insulin to another type because of the price or availability instead of because of medical indications. The two most often used types are Lantus and NPH, but other types are used as well (70/30).

The lack of access to insulin among diabetics is mainly due to their lack of information and organisation. There is huge unmet and uninformed demand for insulin in Cambodia. It is vital for many insulin requiring individuals that informed intermediaries are not allowed more than a fair profit margin. MoPoTsyo can play a useful role here helping people to get access and getting them organised.

### **Training materials**

The list of training materials in the Peer Educator training kit has grown over time. The list is in annex. is This kit must be replenished, depending on the reported activity of the peer educator.

### **Quality and Cost of Medicines**

Poor patients cannot afford to buy the prescribed medicines at Kossamak National Hospital because:

- they forego income every month when they lose an afternoon going to the Hospital
- they pay double the market price for the medicines
- they have to pay for transportation costs every month to and from the hospital
- they are being prescribed brand medicines

- they are being prescribed unnecessary medicines
- they have to pay for unnecessary tests;
- they must pay for other costs such as parking, administration, consultation;

For one third or more of Cambodians it is impossible to adhere to the prescribed treatment because of the above costs. For them, MoPoTsyo reduces the cost of treatment by counseling them to procure more affordable medicines and to reduce their prescription to what is essential for them.

## **Public service**

Brand Drug promotion creeps into the prescription in the public service. This is problematic for many Cambodians, see above. Some drug companies pre-print prescription block notes with the brand drug already mentioned. The companies give these out to the public service staff. Many registered members of MoPoTsyo have received telephone calls from drug companies who try to convince them to buy special “sugar free” products and who invite them to attend promotion meetings. It seems that the public services give or sell lists of patient telephone numbers to drug promoters...

The subsidized public service benefit package that takes care of the most common clinical problems has forgotten to include diabetes despite the high prevalence of this disease. The package (MPA and CPA) was defined in the early nineties. With the survey results on the surprisingly high prevalence of diabetes and hypertension in rural and urban Cambodia, published in *The Lancet* of November 2005, there is an urgent need for to adapt the benefit packages. This means that there has to be an administrative patient follow up system for chronic patients in the public service.

## **Migration**

The urban slum areas have a high degree of in- and out migration. MoPoTsyo registered 300 members. Of these members some have moved out of the area and are no longer living there, while others live there on and off, as they have another place to live in the country side. This kind of out migration can help to spread self management knowledge and skill to remote areas. A high degree of in migration implies that we will have to organize a new urine glucose detection round at some point, not just to make new people aware with urine glucose testing, but also give a second opportunity to the existing population to be detected.

## **Wealthy people**

The peer educators report that wealthy people, although diabetic, are often not interested in registering with MoPoTsyo. They say that they can afford a “real doctor to take care of them”. This shows that patient education is not well understood. On one hand, they do not get proper education from the service provider, while on the other hand they think the peer educator is a substitute for a visit the doctor. It is ironic that poor people in the slums can benefit from a better total care package than wealthy people. Doctors who treat diabetes often substitute lifestyle adaptation by extra medication or higher dosages. This kind of doctoring is of course quite popular with patients.

## **Health Insurance**

Diabetes related services are excluded from social health insurance benefits. Urban membership of health insurance is too small and outside the geographical areas where MoPoTsyo is active. In the future, MoPoTsyo can try to negotiate, on behalf of its membership, inclusion of diabetes related services into the benefit package.

## Cost containment

Diabetes related services are routinely excluded from health insurance coverage because of the perceived high costs. MoPoTsyo tries to deal with this issue. It is understandable that newly detected patients require intensive attention while they need to come to terms with their disease, adapt their lifestyle, possibly meet with a diabetes service provider to get a full examination and a prescription, learn how to self manage and need to be regularly controlled. The intervention is trying to reduce costs :

- by increasing self management capacity of the patient, including *of course* the capacity to self health-service;
- by shifting services from the traditional health staff to the community based peer educator;
- by using low cost technologies where possible, such as urine strips, 24-hour urine collection in containers with boric acid;
- by organizing courses inside the patient's own community;
- by training non health diabetes patients to function as educators;
- by increasing access to affordable anti diabetic medicines;
- by reducing tests;
- by focusing on health outcomes and organizing a favourable incentive structure;
- by reducing transport costs through:
  - o group travel
  - o promotion of bicycle use
  - o supporting a visit to the formal service provider only "if necessary", not automatically;
  - o organize six monthly public supply to stable patients;

## Peer Educator role

There is big risk that peer educators become "kruu" and start to act as local doctors. This risk needs to be managed and contained. It is constant topic of discussion and attention. There is a Medical doctor trained in Diabetes care employed by MoPoTsyo. He is in charge of training of the peer educators. Patients like to be taken care of by a peer educator instead of taking care of themselves. This is a trap. Peer Educators like to perform the blood glucose test themselves instead of allowing the patient to use the meter. The same goes for the blood pressure measurement, which is always carried out by the peer educator instead of by the patient herself. It is important that the peer educator records the patient's progress, to report this to MoPoTsyo, so MoPoTsyo can intervene if that is necessary. Most patients are analphabetic, so they have problems writing down their own disease progress. It is time for a renewed effort to strengthen the self-management capacities of the patient themselves.

## Monitoring

MoPoTsyo's intervention monitoring happens at 4 levels:

1. patient monitors his disease control progress
2. peer educator monitors the patient
3. Diabetes Program manager monitors the Peer Educators
4. MoPoTsyo monitors the inputs, processes, outputs and outcomes

### *Level 1: Patient monitors disease progress:*

Many patients are no longer using urine strips. Patients rely on a weekly blood glucose monitoring by the Peer Educator, mostly at the house of the peer educator. This is costly and keeps the patients dependent on the peer educator. The patient is not recording his own results. The patient usually knows very well how high the blood glucose and blood pressure should be. The patients also know if they are doing alright or not. The urban intervention was monitored using HbA1c. This test costs USD 5 per result. This is too expensive and the test is not strictly necessary. MoPoTsyo needs to reinforce the self monitoring by the patients using urine strips and make them record the results;

### *Level 2: Peer Educator monitors patient*

The current system has produced good results and good health outcomes for the registered members;

### *Level 3: Diabetes Program Manager monitors peer educators*

The current system has produced good results;

### *Level 4: MoPoTsyo monitors:*

There is book keeping, stock keeping, reporting and data base that generates reports and can be used for analyses.

## Public Policy

It is time for the Ministry of Health to give diabetes care, and care for other common non communicable diseases an appropriate place inside the public health system, organizing a continuum of care, with an eye on quality, but also on financing and access. The Non Communicable Disease Strategy provides a first step. Many details have not been worked out. There is a need for pilots that fit in the strategy and test implementation.

The Operational District has an important new role to play with regards to the community response in non communicable diseases.

With equity funds and social insurance being developed, there is an important opportunity to include essential benefits as part of the care package that is offered. For this reason, the traditional service model for acute disease cannot be maintained.

This urban intervention should be tried out in a rural operational district to inform public policy with regards to diabetes care.

## **Conclusion and recommendations**

The findings show conclusively that MoPoTsyo is indeed well underway towards reaching its (adapted) intervention objectives which aim to improve access to information for people living with diabetes in poor urban communities. There are technical opportunities for MoPoTsyo to strengthen the quality and intensity of patient follow-up to produce better health outcomes, but this may also drive up the costs jeopardizing sustainability.

### **There are 7 main areas for consideration and further strengthening of the intervention design:**

1. Health Promotion and protection against health related poverty for the general population
2. Quality and affordability of medicines
3. Health Equity Funding
4. Quality of the Continuum of Care
5. Monitoring and Evaluation
6. Gender
7. Sustainability

**GENERAL POPULATION:** MoPoTsyo has not yet measured if the non-diabetic persons in the slum area know what to do if they develop symptoms of diabetes. This can be done through a survey towards the end of the project.

**MEDICINES:** Purchasing of cost effective medicines: It is not enough just to guide people on which medicines are cheap, without having adequate drug quality control mechanisms in place related to those medicines; the best solution in the long term is to have anti-diabetic medicine and hypertension medicine supplied through the normal public drug supply system; MoPoTsyo can help to create a system of drug supply for chronic patients that piggybacks the existing system by creating a registered and organized membership whose drug consumption is recorded and known to the organisation; In the short term, MoPoTsyo can organize quality testing of the diabetic medicines and hypertension medicines, ( including the so called “purity-tests”) which it recommends to be bought by the members;

**MEDICINES: POLICY:** MoPoTsyo can advocate for prescription of generic medicines in the public service, reducing direct promotion of brand medicines among the patients of the public service. The list of telephone numbers of patients of public services should not be given to pharmaceutical companies.

**HEALTH EQUITY FUNDS:** MoPoTsyo has not yet measured if those for who the equity fund stops to pay are doing just as well as those for who the equity fund is still paying; Maybe those who are benefiting from the equity fund do better than those who are no longer benefiting from the equity fund. This is now unknown.

**HEALTH EQUITY FUNDS:** It may be preferable to continue partial funding of health related costs of equity fund beneficiaries to facilitate patient follow up in the longer term of vulnerable patients; If MoPoTsyo continues to fund, for example 25% of medicines, it can better keep contact with the patients and follow how they are doing;



QUALITY: It is questionable whether MoPoTsyo should continue to recommend its members to use HbA1c, as it is expensive and difficult to finance. There are more cost effective methods to assess glucose control;

QUALITY: MoPoTsyo may consider if it can record not just of what medicines people have been prescribed, but also whether they actually adhere to drug treatment or not, so it can compare treatment adherence with individual health outcomes;

QUALITY: Peer Educators have become service providers to patients often instead of patients being applying certain self-management skills: the patients are not themselves using the blood glucose meter at the MoPoTsyo Patient Information center where they gather once a week nor the blood pressure meter nor do they record themselves their progress. All these activities are done by the peer educator for the patients. Maybe patients can be enabled to do some of these things themselves.

QUALITY: SUSTAINABILITY: MoPoTsyo should write a draft Terms of Reference for the “community based diabetes Peer Educator” to discuss with partners and stakeholders;

QUALITY: Choice of glucose test: HbA1c is too expensive to use on large scale. MoPoTsyo can use it in random samples per intervention area; There are not enough Fasting Blood Glucose tests taken. Patients are not using the cost effective urine strips themselves because there is not enough explanation about their utility and they are not provided and because there is no incentive related to the proper use of urine strips;

QUALITY: Peer Educators can be trained more on signs of complications and co-morbidities; the assessment questions related to macrovascular and microvascular problems are not clear for the patients, so they need to be re-phrased.

QUALITY: MoPoTsyo should apply one standard methodology for measuring blood pressure. Although the international standard recommends that the patient sits down on a chair with her arm resting on a table, this standard is unpractical for the local circumstances many of the instances when blood pressure is taken by the peer educator. It is time to standardize the method in each area, so the measurements can be compared with each other without doubts that variation is due to the way of measurement. This issue should be included in the training of peer educators;

QUALITY: M & E: MoPoTsyo is not presenting data that show how many of its patients meet *all* the criteria of success. For example it is nice to know that the majority of patients feel more in control, but what if an individual patient feels in control, but he/she is not in control of their blood sugar, and the other way around. It would also be interesting to relate the health outcomes to knowledge, to drug adherence, and feeling in control, instead of measuring and presenting separately all indicators. However, the sample size may not always be large enough to produce significant findings.

QUALITY: MoPoTsyo should check if everyone who is taking Metformin has had creatinine checked at least once a year with the result recorded and action taken if it is too high;

QUALITY: MoPoTsyo can consider to send patients with a diabetes history of more than 5 years for eye exam;

QUALITY: MoPoTsyo can teach the peer educators how to assess proteinuria among patients;

QUALITY: MoPoTsyo can organize assessments of cholesterol levels among all patients with diabetes, prioritizing hypertensive overweight patients;

GENDER : Most patients are women, but most peer educators are men. There should be more balanced representation; Inside the head quarter office, the genders are not equally represented either.

M & E: For 6 monthly evaluations, rather than checking all patients' health outcomes, it is more efficient to continue with random sampling, as is already done with knowledge assessments. The applied method of Lot Quality Assurance Sampling requires samples of just 19 individuals yielding results with an  $\alpha$ -error of  $<0.1$  and  $\beta$ -error of  $< 0.1$ , which is enough for MoPoTsyo's management purposes, to compare how intervention areas are doing relative to each other, with regards to a large number of indicators.

M & E: MoPoTsyo has collected enough baseline information about the knowledge of patients when they register. Only assessments of randomly selected patients are necessary. MoPoTsyo can develop an instrument to assess whether patients who have poor health outcomes have well understood the information they received during the sessions.

M & E: When making quantitative assessments in the intervention areas, MoPoTsyo should include a question or questions related to the amount and intensity of physical activity that patients are doing;

M & E: When making quantitative assessments in the intervention areas, MoPoTsyo should include a question or questions related to whether the patient thinks he is now spending less on health care than before he registered with MoPoTsyo;

RESEARCH: While the intervention was going on, one third of the registered overweight patients are still putting on weight. MoPoTsyo first needs to learn how these weight gaining people can be made to reverse this trend before it can effectively reach them. MoPoTsyo needs to study the group of concerned individual patients and see what the common causes are and what the common opportunities are for change. The discouraging environment needs to be addressed as one of the obstructing factors but there may be others.

RESEARCH: Data collection for a Cost Benefit Analysis should be planned and organized before the arrival of the expert who will carry out the study, so MoPoTsyo should pro-actively contact potential candidates and make preparations; MoPotsyo will need to find funding to finance this study.

SUSTAINABILITY: In the poor communities people who work as peer educators must be compensated for the activities they undertake and the time they spend to follow up diabetic community members. The levels of reimbursement are so low, that sustainability should not be a big problem, provided the intervention remains cost effective and a third party payer is found who has an interest in savings that the intervention generates. As long as this third party payer does not exist, donors who are interested in reducing poverty can foot the bill via MoPoTsyo. These donors exist, can be found and engaged in particular among people with diabetes in developed countries.

SUSTAINABILITY: There may be more opportunities for using existing public health infrastructure and allow the rural variation of this intervention to piggy back investments by other disease programs and the operational district in general;

URBAN SLUMS: SUSTAINABILITY: The external funding of the 3 urban interventions ends at the end of 2007. The time that remains must be used to strengthen the chances of sustainability of what has been achieved. The proposal already indicates that it plans to explore possibilities to obtain financial support from equity funds, health insurance and from twinning with diabetes associations overseas.