

8 Yes, they can

Peer educators for diabetes in Cambodia

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Summary

It seems clear that Cambodia's health services cannot meet the enormous and rising needs from people with diabetes. Innovative approaches are required to mitigate the impact of the rising epidemic. One possible route is suggested by the concept of 'disruptive innovations', entailing a focus on models that, typically by exploring alternative input combinations, can deliver good low-cost products or services at a price that makes them accessible to the great majority of the population. One model that seems of particular interest in the treatment of diabetes is the 'facilitated user network', which uses the combined resources of a range of stakeholders – patients, their families, physicians, pharmaceutical suppliers and community workers – to construct supportive and mutually beneficial networks. Since 2005 the MoPoTsyo programme has been establishing diabetes 'peer educator networks' to detect and support diabetes patients. This study is based on analysis of routine monitoring data for 386 rural diabetes patients who have been enrolled in the programme for at least three months, and data from two assessments of a random sample of these patients, carried out in July 2008 and January 2009. After eighteen months, ten peer educators had found 474 diabetes patients, two-thirds of them previously unaware of their condition. The data on these patients indicate improvements in fasting and postprandial blood glucose, and blood pressure, even though half of them had not yet consulted a doctor. Their reported health expenditure appears much more affordable than that of most diabetes patients in Cambodia. In the absence of a massive government or international response to the unmet needs of Cambodians with diabetes, peer educator networks may play a useful role in mitigating the disease's negative impacts on the lives of sufferers by providing a low-cost but effective care structure despite the low-resource environment.

Introduction

There is increasing awareness of the widespread prevalence of chronic diseases and the consequent burdens on both populations and health services (Abegunde *et al.*, 2007). The WHO (2005) projects 388 million deaths from chronic diseases

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1 in the next ten years, the majority in the economically active age group and 80 per
2 cent in low- and middle-income countries. The implications for these countries,
3 many still struggling to cope with a high burden of infectious diseases and the
4 AIDS pandemic, are extremely serious. Some appear to have decided that, given
5 the perceived costs, providing adequate management of chronic illnesses is an
6 unobtainable goal, at least over the short to medium term. In the absence of very
7 substantial additional resources from the international community (Anderson,
8 2009), the prospects seem bleak, especially as the prevalence of many chronic
9 illnesses appears to be rising inexorably, partly owing to increased longevity.
10 There is a substantial risk that desperation will drive many people into the arms of
11 unscrupulous individuals and organizations that will add to their financial burdens
12 while failing to mitigate, or even worsening, their health problems. Innovative
13 approaches are urgently needed.

14 This chapter focuses on one of the most important chronic diseases, diabetes
15 (WHO, 2009). A recent *Lancet* article described it as ‘now a global problem, equal
16 in size to that of HIV/AIDS’ (Lefèbvre and Silink, 2006). Much of that problem is
17 hidden, with the majority of patients in poorer countries remaining undiagnosed.
18 One group of these will, at least initially, be asymptomatic, while others will suffer
19 on a daily basis from the multiple effects of hyperglycaemia, including nocturnal
20 polyuria, relentless thirst, dry throat, permanent hunger, eczema, ulcers, dizziness
21 and fatigue. Both undiagnosed and diagnosed patients will often receive inade-
22 quate or inappropriate care, adding the effects of medically induced hypogly-
23 caemia to the panoply of potential symptoms. Healthcare providers frequently lack
24 the training required to recognize the symptoms of poor glycaemic control. Health
25 facilities often lack the resources to treat the causes. In consequence, a majority of
26 patients suffer the early onset of long-term complications, often resulting in
27 premature death. Yet much of this suffering can be delayed for years, and even
28 prevented, if patients make suitable lifestyle changes and are given the opportunity
29 to adhere to appropriate medication.

30 If neither public- nor private-sector health providers appear likely to deliver the
31 required products and services to the great majority of diabetes sufferers, most of
32 whom lack the resources typically needed to purchase quality care, it may be
33 appropriate to explore more innovative approaches. A relatively recent conceptual
34 framework for innovations research proposed by Bower and Christensen (1995)
35 may provide clues as to the possible characteristics of such an approach. Bower
36 and Christensen classified innovations into two categories: sustaining and dis-
37 ruptive. Most were seen as falling into the first category, offering improved quality
38 or additional functionality. On the other hand, disruptive innovations typically
39 offer simplicity, convenience and lower cost, possibly accompanied by a reduction
40 in non-essential qualities, features or functions. One target audience for these new
41 products or services would be those who had previously felt excluded by price or
42 technical barriers to access.

43 A later paper (Christensen *et al.*, 2006) specifically discusses the potential
44 implications of disruptive innovations in the social sectors. The core argument is
45 that many service delivery organizations, both public and private, prioritize the

1 provision of high-quality services even if this involves a serious trade-off in terms
2 of the size of the population they are able to serve effectively. This situation may
3 be motivated by the best of intentions. Those responsible for service provision are
4 typically highly skilled and qualified individuals trained in, or at least with
5 exposure to, health systems in countries that can afford to deliver high-quality
6 services to large populations. As professionals, they cannot be blamed for aspiring
7 to the 'best practice' standards established in such countries. They may react badly
8 to what they would interpret as suggestions that their patients should be offered
9 treatment that falls below those standards. On the other hand, as the paper argues,
10 and very much in line with the situation relating to chronic illness discussed above,
11 it is often inconceivable that sufficient resources will be made available to extend
12 these best-practice services to all those in need.

13 The approach suggested in the paper is to promote organizations that engage
14 in 'catalytic innovations', a sub-set of disruptive innovations focusing specifically
15 on social change that offer 'good enough' alternatives to the underserved popula-
16 tion. These organizations will rarely emerge from the ranks of established providers,
17 given that they have 'resources, processes, partners, and business models designed
18 to support the status quo'. They will rarely 'disrupt themselves' (Christensen *et al.*,
19 2006, p. 96). Again this argument seems plausible when applied to formal public
20 and private healthcare providers in low-income countries. Hwang and Christensen
21 (2008) explore this notion by considering the possible 'business models' that
22 healthcare providers might adopt. For present purposes the most interesting of these
23 is the 'facilitated user network'. This aims to provide opportunities for transactions
24 between the members of a stakeholder network, with value deriving from the ease
25 and quality of the transaction process. The article notes that such networks are
26 already playing a limited role in the provision of health care. They are often focused
27 on specific medical conditions, for example obesity, addiction and HIV/AIDS,
28 where information exchange and social learning process are highly valued. In the
29 next section we consider one such network that appears to demonstrate how positive
30 change can be achieved for those affected by diabetes, even in one of the world's
31 poorest countries.

32 33 **Diabetes in Cambodia** 34

35 Cambodia has a population of 13.4 million, 80 per cent living in rural areas. With
36 a gross national income estimated at US\$540 per capita for 2007 (World Bank,
37 2009), it faces severe problems in coping with both communicable and non-
38 communicable diseases (Janssens *et al.*, 2007). Two epidemiological studies
39 published in 2005 found over 250,000 people suffering from diabetes, two-thirds
40 of them being unaware of their condition (King *et al.*, 2005). The dysfunctional
41 diabetes healthcare environment is graphically illustrated by the title of a recent
42 report, quoting from one sufferer: 'I wish I had AIDS' (Men *et al.*, 2012). That
43 report describes how people consult multiple public and private providers in a
44 costly but typically unsuccessful search for correct diagnosis and effective
45 treatment. The appropriate medicine for most diabetes patients, an affordable oral

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1 generic drug, is available in private pharmacy outlets but extremely hard to locate
2 among the plethora of medicines of varying price and unknown quality promoted
3 by thousands of licensed and unlicensed pharmacies.

4 Diabetes is not yet part of the standard public health services package, and many
5 qualified doctors are uncertain as to appropriate treatment. Without additional
6 training and guidelines, the needs from over 80,000 diagnosed diabetics for basic
7 health services cannot be met. With double that number unaware of their condition,
8 alternative solutions must be considered to reduce the enormous gap between
9 needs and response.

10 The MoPoTsyo Patient Information Centre (MoPoTsyo, 2009) is a Cambodian
11 NGO using an innovative approach to diabetes diagnosis and management, based
12 on the 'peer educator' (Paul *et al.*, 2007) and 'informed patient' (Kober and Van
13 Damme, 2006; Henwood *et al.*, 2003) concepts. It aims to create empowered
14 patient networks, each consisting of 500–1,000 registered members organized
15 around a team of peer educators, to support the pursuit of affordable and trust-
16 worthy health care. It operates both internally – providing information on self-
17 management, advice and counselling – and externally, mediating between those
18 in need of care and a wide variety of public and private doctors, pharmacists and
19 other service providers. A small salaried staff is employed to establish and support
20 the semi-autonomous networks in building trust, identifying and training new peer
21 educators and organizing themselves under a diabetes programme manager (DPM)
22 appointed jointly by MoPoTsyo and the local health authority. MoPoTsyo also
23 manages its own Revolving Drug Fund.

24 The peer educators, who receive six weeks' formal training, have themselves
25 recently recovered from years of serious illness and gain the trust of their com-
26 munities because they can relate personal experience of the effects of poor
27 glycaemic control. After accreditation they qualify for basic equipment and
28 supplies, based on reported activities, and are allowed to identify their home as a
29 'Patient Information Centre' for weekly patient gatherings and education sessions.
30 Newly qualified educators will screen their community for diabetes. Initial
31 screening is based on adults self-testing with urine strips. The educator counsels
32 those with positive strips and confirms their result using a blood glucose meter.
33 The critical levels are: fasting blood glucose (FBG) ≥ 126 mg (7.0 mmol) and/or
34 postprandial blood glucose (PPBG) ≥ 180 mg (10.0 mmol). Peer educators are also
35 trained to take a simple patient history using a form that records items including
36 the measurements of FBG, PPBG, blood pressure (BP), urine glucose, weight and
37 height. Screening will start within the peer educator's village and be extended over
38 a period of one to two years to cover an area designated by MoPoTsyo in agree-
39 ment with local health authorities.

40 Newly detected diabetics can only become registered members after approval
41 from the DPM, who oversees all peer educators in the health district. The patient's
42 record is then included in a database for follow-up by the peer educator, monthly
43 reporting by the DPM to the health authorities and entry into the local network's
44 own Khmer Open Source database. This is compatible with software used at the
45 central level, where data can be aggregated and analysed.

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New patients may attend six classes at the home of their peer educator. They are typically encouraged to stop smoking, become more physically active and improve or maintain weight. Peer educators discuss nutrition issues using the MoPoTsyo food pyramid, which is based on a glycaemic index (GI) of locally available food items (Figure 8.1). Every patient receives an A3-size poster to put on the wall.

The staple food of Cambodians is white rice, which is eaten three times each day. Unfortunately, the common variety is highly glycaemic (Seng, 2007), owing to machine polishing. One important piece of peer educator advice is to change from white rice to less polished or even to whole rice, mixed, for example, with mung beans (GI = 31) or other vegetables from the low-GI green area on the poster. All of these are also richer in protective vitamins and minerals than the



Figure 8.1 Glycaemic index food pyramid.

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1 white rice. The use of beans as a staple is unheard of in rural Cambodia, where
2 they are grown but eaten as a dessert, boiled in sugar water.

3 Patients are provided with urine glucose strips each month. They are encouraged
4 to use these within three hours of eating to detect after-meal glucose peaks. This
5 relatively simple self-testing procedure is easily learned and reasonably reliable,
6 provided that kidney function has not deteriorated. Patients are also asked to
7 perform a twenty-four-hour urine test twice a month. All test results are recorded
8 in their self-management book.

9 If lifestyle changes produce insufficient results within a few months, or sooner
10 if warranted by the patient's condition, peer educators assist patients to obtain an
11 appointment with a specially trained medical doctor (MD). In practice, they
12 function as gatekeepers for such visits. This MD is contracted by MoPoTsyo to
13 hold consultations at the local public hospital once per week to initiate or change
14 medical treatments for diabetics. The MD prescribes from a limited list of twenty
15 medicines, including insulin, though the latter is considered appropriate only in 5
16 per cent of diabetes patients. The prices of these medicines vary considerably and
17 the MD must consider the affordability of the total monthly cost for a given
18 patient, consulting the peer educator if that patient expresses concern. In practice,
19 90 per cent of patients can afford to buy prescribed medicines at the pharmacy
20 contracted by MoPoTsyo, where they are sold to registered patients at a published
21 fixed price. Peer educators are instructed *never* to prescribe or advise patients
22 which medicine to buy. Their role is limited to providing patients with information
23 about the typical cost ranges they can expect if they go for medical consultation
24 and prescription; to show patients how to divide high-dosage tablets, which are
25 relatively cheaper, into pieces that meet their daily requirements; informing the
26 DPM if a patient has a prescription for a drug that is not on MoPoTsyo's list; and
27 collecting feedback from the patients about their experiences with the dispensing
28 pharmacies.

29 Initially, consultation costs were met by MoPoTsyo's Health Equity Fund, but
30 the use of the fund for this purpose is no longer common practice. To make the
31 service financially sustainable, the patients have agreed to pay a user fee, which
32 does not include the prescribed routine medication. The Health Equity Fund
33 remains available to the very poor, about 10 per cent of patients, and assists them
34 to pay for the cheapest available prescription options. There is, for example, no
35 support to help a patient buy a more expensive angiotensin-converting enzyme
36 (ACE) inhibitor instead of a cheaper beta blocker. A relatively large proportion of
37 type 2 diabetics requiring insulin receive this assistance, which covers up to 50
38 per cent of their monthly costs. The assistance is possible because so few patients
39 require insulin and its provision in these cases is seen as meeting the expectations
40 of the wider community. Every opportunity is taken to reduce the cost of living
41 with diabetes in order to make the intervention financially sustainable.

42 The peer educators are not salaried. They receive small incentives based on their
43 reported activities. Their travel expenses are reimbursed and they receive a twice-
44 yearly total performance bonus based on measurement of some thirty, regularly
45 changing, outcomes on a random sample of nineteen of their patients. The July

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1 2008 assessment bonuses varied in size from US\$29 to US\$72, paid to seven peer
2 educators who had more than 300 patients to follow up.
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Data

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6 This study is based on analysis of:
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- 8 • Routine registration and follow-up data collected between 1 July 2007 and 31
9 December 2008 by peer educators on 386 rural diabetes mellitus patients
10 enrolled in MoPoTsyo for at least three months, including FBG, PPBG, urine
11 glucose, BP and body weight.
- 12 • Data from two assessments carried out by trained health workers in July 2008
13 and January 2009 of 133 and 152 randomly sampled patients respectively,
14 including HbA1c, body weight, reported health-related expenditure, data
15 related to self-management knowledge and skills, and patient opinions as to
16 peer educators and care. The blood samples were analysed at the Diabetes
17 Service of National Kossamak Hospital to assess the HbA1c (glycated
18 haemoglobin), using a Biorad D-10 Hemoglobin A1c testing system.
- 19 • Health expenditure data for households with a patient with diabetes are
20 extracted from a household survey in rural Cambodia conducted by the Center
21 for Advanced Study as part of the POVILL Consortium (POVILL, 2009).
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Findings*Screening, detection and retention of diabetics*

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27 Over the eighteen months ending 31 December 2008, peer educators reached more
28 than 80 per cent of adults among the district population, with 53,839 using a urine
29 glucose strip after a meal. Of those testing positive, 474 were confirmed as diabetic
30 following a further blood glucose test and all registered with MoPoTsyo. Sixty-
31 seven per cent had previously been unaware of the cause of their ill health. As can
32 be seen in Figure 8.2, the total number of members grew steadily even though 11
33 per cent of registered patients departed (3 per cent dying, 4 per cent leaving the
34 area and 4 per cent losing interest).
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Lifestyle counselling and self-monitoring

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38 In the second assessment, 41 per cent of patients claimed that they engaged in
39 strenuous physical labour or exercise for more than three hours per week. Almost
40 all (94 per cent) of the remainder indicated that they knew that they should do
41 more, and 87 per cent of patients reported that their activity level had increased
42 after entering the programme. Around 84 per cent of patients said that they had
43 reduced the quantity of white rice in their diet. Sixty-three per cent had a body
44 mass index (BMI) that had either remained in the normal range (18.5–23.0) or
45 improved since enrolment. Among those whose BMI value had worsened, 85 per

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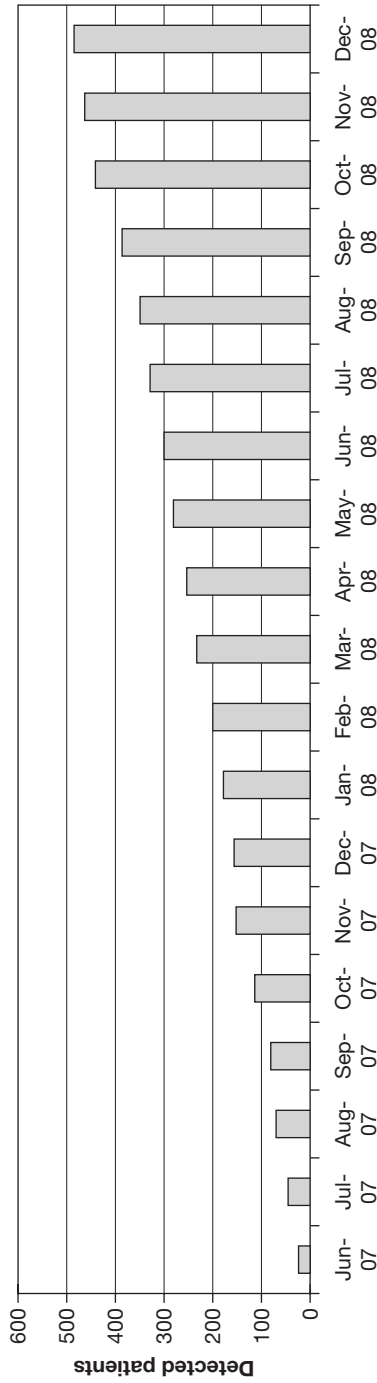


Figure 8.2 MoPoTsyo membership growth between June 2007 and December 2008.

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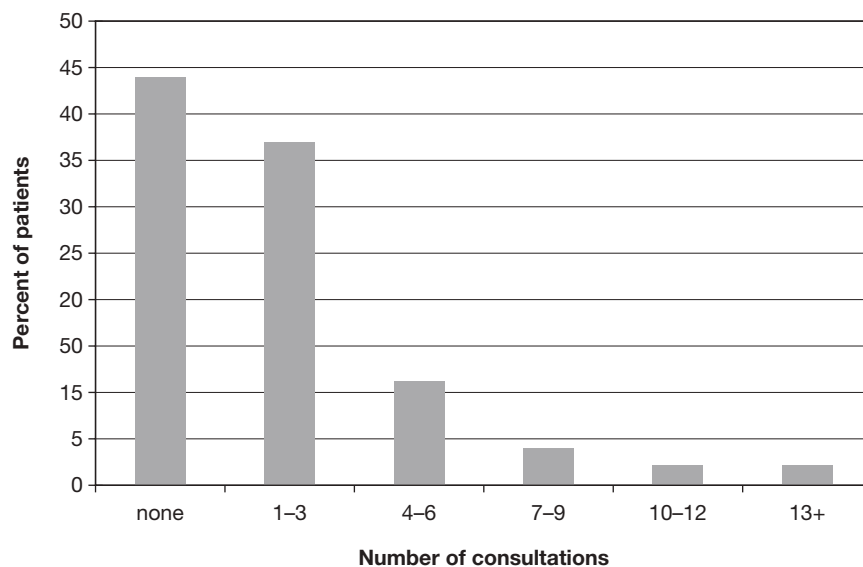
1 cent had gained weight. Overall, 46 per cent were overweight (BMI >23.0) and
 2 11 per cent obese (BMI >27.5), while 14 per cent had a BMI ≤18.5. Peer education
 3 on this issue has not proved entirely straightforward. Almost a quarter of those
 4 concerned did not accept the suggested need to adjust their weight.

5 Review of patient self-management books indicated that 71 per cent had
 6 recorded more than two urine glucose results over the previous month. This figure
 7 was depressed by the 5 per cent rate in one new peer educator area, while the other
 8 seven had rates of 80 per cent or more. The complicated 24-hour urine test proved
 9 more problematic, with just over 40 per cent of patients being able to correctly
 10 describe the procedure.

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 12 ***Medical consultations, prescriptions and reported health expenditure***
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14 As is indicated in Figure 8.3, 44 per cent of patients have not yet seen a physician,
 15 while 2 per cent have had 13 or more visits. Overall, the average number of
 16 consultations per patients was 2, but this varied substantially (from 0.67 to 3.49)
 17 between peer educators.

18 Some 55 per cent of patients have thus far been put on prescription drugs at
 19 some point. Table 8.1 provides a detailed breakdown of the drugs prescribed by
 20 consultation sequence. This indicates that glibenclamide is prescribed for 70 per
 21 cent of patients attending an initial consultation, while insulin is prescribed for just
 22 2 per cent. After the second consultation, the glibenclamide frequency gradually
 23 increases to a maximum of 88 per cent at the time of the fourth consultation, but
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 44 *Figure 8.3* Percentage of patients receiving MD consultations, June 2008 – December
 45 2008.

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Table 8.1 Content of prescriptions at the first and second consultations

<i>Consultation</i>	<i>First</i>	<i>Second</i>
<i>Number of prescriptions</i>	263	166
Aspirin 300mg	71%	73%
Glibenclamide 5mg	70%	77%
Metformin HCl 500mg	56%	68%
Vitamin B	46%	44%
Atenolol 100mg	44%	39%
Amitriptyline 25mg	29%	30%
Paracetamol 500mg	26%	25%
Captopril 25mg	19%	19%
Hydrochlorothiazide 50mg	13%	22%
Furosemide 40mg	8%	7%
Insulin-NPH 10ml.	2%	1%
Insulin-Lantus 3ml	0%	1%

prescription of insulin remains a rare event. In fact, the prescription profile does not change much, despite frequent consultations. This is partly because it reflects a series of compromises between medical needs and cost affordability for individual patients.

In the January 2009 assessment, patients reported average health-related expenditure of US\$3.19 per month, varying from US\$1.13 to US\$5.53 across different peer educators. Unpublished data from a recent household survey (Lucas *et al.*, 2008) indicate that forty rural Cambodians reporting diabetes had spent an average of US\$52.06 per month. Only four reported expenditures below US\$3.41, while half paid more than US\$13.9 and eight more than US\$61. This would indicate that for most Cambodians the cost of living with diabetes is far higher than for those within MoPoTsyo.

Glucose control

Initial screening measures FBG and PPBG levels in capillary whole blood, following the cut-off points established in WHO guidelines (WHO, 2006). Mainly on cost grounds, routine monitoring of patients uses these same testing methods complemented by urine glucose measurements recorded by patients themselves. The six-monthly assessments of a random sample of patients from every peer educator do include HbA1c testing to allow quality control and monitoring of aggregate glucose control across the network over time (Figure 8.4).

Measurement of the progress of individual or specific cohorts of patients is done by using BG tests and interpreting urine glucose results. For example, Figure 8.5 provides 2008 quarterly mean BG levels for patients who had been in the programme for at least one year prior to 1 January 2009.

The FBG of most patients with initial hyperglycaemia improves over time, as indicated by Figure 8.6, which shows quarterly measurements for all those with FBG >10 mmol in quarter 4, 2007.

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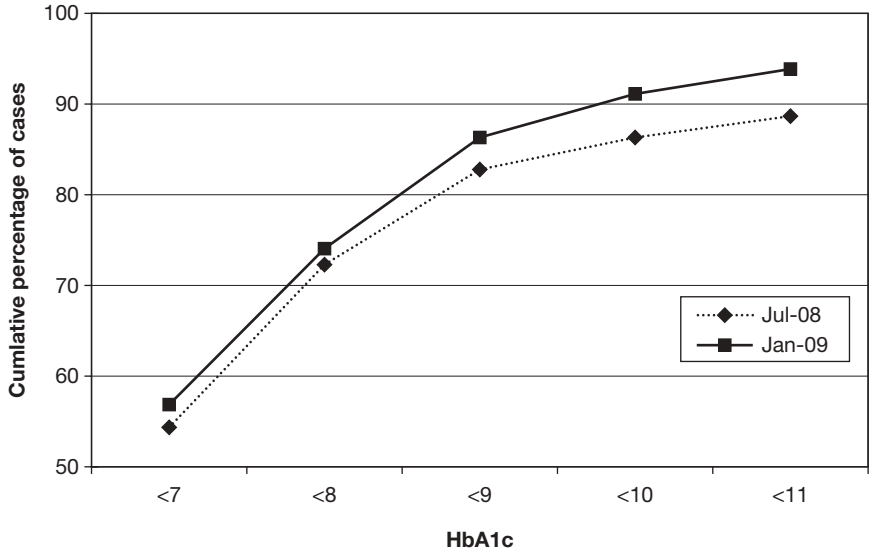


Figure 8.4 Cumulative percentage of cases by HbA1c level, July 2008 and January 2009.

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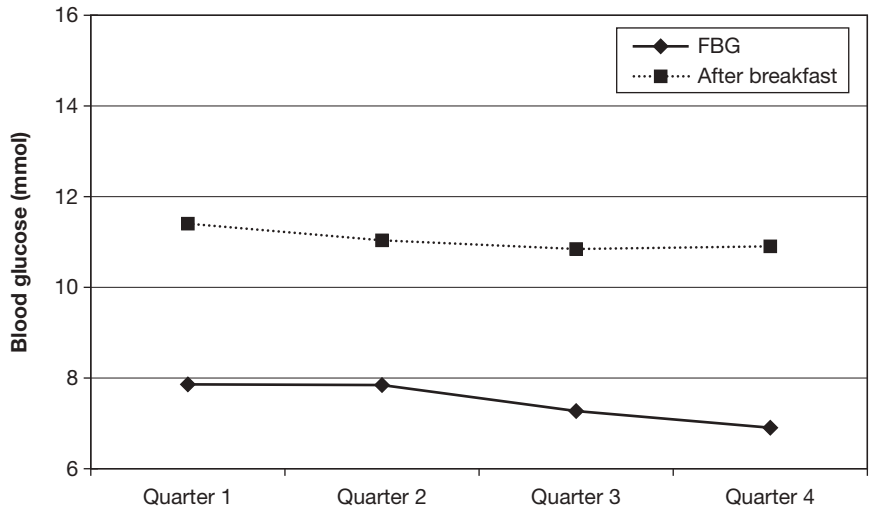
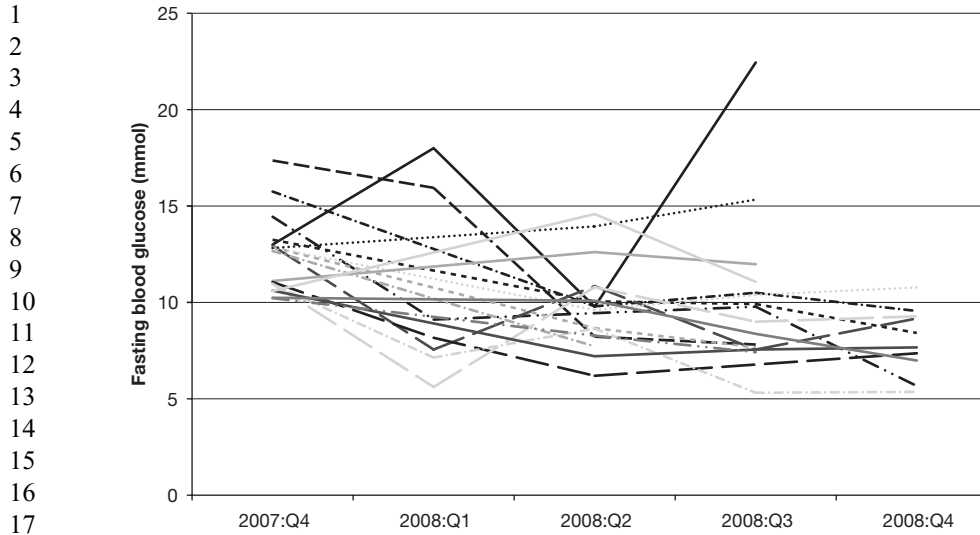


Figure 8.5 Quarterly means for routine BG values (mmol), 2008.

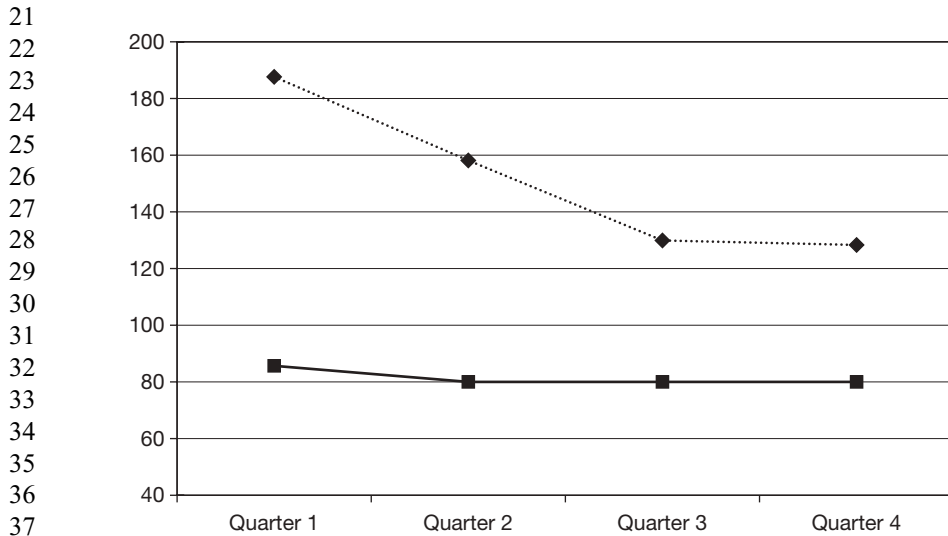
Blood pressure

High blood pressure increases the chance of developing serious complications. The peer educators will probe the patient for action if a patient's resting BP is greater than 130/80. Figure 8.7 shows quarterly average systolic and diastolic blood pressure readings for patients who had been in the programme for at least one year.

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18 Figure 8.6 Quarterly FBG levels for all patients with values >10 mmol in quarter 4,
19 2007.



38 Figure 8.7 Quarterly means in 2008 for systolic and diastolic blood pressure (mmHg).
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Discussion

The experience with peer educators for diabetes in Cambodia shows that it is possible to detect many diabetics in the community, to organize them in peer support networks and support them towards lifestyle changes and self-management. The documented short-term improvements in blood glucose control and in blood pressure are encouraging, as well as the low number of medical consultations deemed necessary, the affordable level of health expenditures and the low drop-out rates. However, the rallying cry in the title of the chapter is not intended to proclaim a breakthrough in technical diabetes care but rather to indicate the potential for peer educator networks to complement professional caregivers, especially where those are scarce, expensive or less effective. The sobering fact is that for the foreseeable future, a great majority of those with diabetes in developing countries will not have access to trained health professionals. The limited number practising will typically have other priorities than implementing the International Diabetes Federation guidelines (IDF Clinical Guidelines Task Force, 2005) on minimal levels of care.

The MoPoTsyo strategy appears to tap into a new pool of human health resources by involving recovered patients in undertaking rudimentary healthcare tasks for their fellow community members. They have the great advantage of local credibility. This enables them, as indicated earlier in the chapter, to persuade most community members to undertake preliminary self-testing, an extremely valuable outcome given that two-thirds of those identified were previously unaware of their condition. They can be an effective local source of information and motivation for people without alternatives, helping them to come to terms with both lifestyle changes and their longer-term prospects. Organizing the peer educators into a local network not only created a structure with a public presence but allowed mediated interaction with key professionals and organizations, including medical doctors, pharmacists and drug wholesalers.

A recent special issue of *Social Science and Medicine* (Bloom *et al.*, 2008) argued for a new approach to health systems that accepted the reality that a 'multiplicity of actors and institutions' were now involved in healthcare production. Progress depended on finding innovative ways of working within that context – not in denying or regretting it. The MoPoTsyo approach can be seen as one such innovation, with peer educators as a new form of community health worker (Standing *et al.*, 2008) adapted to the special needs of patients with a lifelong chronic disease, for whom self-management and peer support seem especially valuable.

The innovation raises questions that require further study. How can the peer educator networks best complement diabetes services where those are available? How should the approach be adapted to address multiple chronic diseases? The vertical national programmes for TB and HIV/AIDS already work with peer educators. Would it be sensible for multiple peer educators to work in the same community or even follow the same patient? Should peer educators actually 'peer-educate' on a disease or even a co-morbidity that they have not experienced themselves?

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1 However, there seems to be inherent merit in organizing and supporting diabetic
 2 patients towards lifestyle changes and self-management. The relation that the
 3 networks develop with professional healthcare systems will depend most of all on
 4 local realities and on locally negotiated arrangements. However, in a country like
 5 Cambodia the challenge posed by diabetes is so huge and the current health system
 6 so under-resourced that peer educators may have to play a larger role. They will
 7 need support in doing so, not as an easy or quick fix but as a labour-intensive
 8 strategy to build capacity at the level where it is most needed and immediately
 9 relevant.

10 The above discussion was introduced by reference to the concept of disruptive
 11 innovation. It may finally be worth reflecting on a related, and to some extent
 12 overlapping, concept, that of ‘reverse innovation’ (Immelt *et al.*, 2009). This refers
 13 to innovations that are likely to be first adopted in less developed countries or
 14 regions. Such innovations may well be disruptive if the primary reason for their
 15 development outside more highly developed areas is to appeal to a low-income
 16 population in a market that is primarily driven by price. However, it is suggested
 17 that once a low-cost basic product or service is available and shown to be of
 18 reasonable quality, it may well prove attractive to richer populations, or at least to
 19 those responsible for providing services to those populations. This process would
 20 be enhanced if the quality of the service could be gradually increased while
 21 maintaining the low price. Could networks such as that described above make a
 22 serious contribution to chronic care in highly developed nations? That may depend
 23 on the extent to which economic constraints lead to increased pressure on
 24 established health organizations, with both disruptive and reverse innovations
 25 potentially threatening existing practices and institutional arrangements.

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