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The team undertook a wide range of consultations for the evaluation. CARE Foundation shared vital information on the programme and key insights into it. Helpful reviews were provided by B. Girish Babu (CARE Foundation) and the CARE project team. We would also like to thank the community health workers, who are the pulse of this programme and without whom this evaluation would have been incomplete.

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### EXECUTIVE SUMMARY

The objective of the paper is to evaluate the financial viability of CARE Foundation's rural primary-health-care delivery model<sup>1</sup>, which includes an outpatient insurance product. The model is aimed at providing access to affordable primary health care in rural areas. Since technology plays an important role and is considered key to contributing greater efficiency, the programme's use of technology and the impact of this are analysed in detail.

CARE Foundation, funded by the Microinsurance Innovation Facility at the International Labour Organization, in collaboration with CIRM, piloted an outpatient health insurance product. This paper complements the findings of the household impact evaluation.<sup>2</sup> It presents key findings under the following three categories:

- analysis of key performance indicators of the outpatient insurance product
- use of technology
- business case.

The findings are summarized below.

### I. ANALYSIS OF KEY PERFORMANCE INDICATORS OF THE OUTPATIENT INSURANCE PRODUCT

Indicator	Findings	Inferences
Coverage ratio	Coverage ratio was 4-6 per cent. In the first year, 46 per cent of total policies sold received 80 per cent premium discount, out of which only 17 per cent renewed.	Premium discounts promote initial take-up, but not renewals.
	Within 4 months of introduction, a monthly premium payment product sold six times as many policies as the annual product.	For first enrolment, clients prefer options with small initial premiums, but this may not hold for renewals.

<sup>1</sup> The model envisioned providing primary health care in rural India by enabling access to affordable care at the doorstep and was implemented by the CARE Rural Health Mission, comprises a rural, hub-and-spoke health-care delivery model with a network of CHWs providing primary care. More details on <http://www.carehospitals.com/crhm/crhm.html>

<sup>2</sup> A. Mahal, K. Krishnaswamy, R. Ruchismita and B. Girish Babu: *What is a health card worth? An evaluation of an outpatient health insurance product in rural India* (Geneva, Microinsurance Innovation Facility, International Labour Organization, Research Paper No. 30, 2013).

Coverage ratio	Coverage ratio was highest in the villages located 11 to 25 km from the central clinic. There is less penetration in the villages which are closer to or further away from the clinic.	A product dependent on a hub-and-spoke health-care delivery model will have highest take-up in locations which are neither too close nor too far away from the clinic.
Claim incidence	Community health workers (CHWs) <sup>3</sup> experienced a 46 per cent increase in claim incidence after 1 year, which led to a higher overall claim incidence (169 per cent) than public insurance schemes.	The presence of a health worker in the village increases access to primary care, possibly due to proximity.
Claim ratio	A claim ratio of 148 per cent (in Year 2, the highest yet), was experienced.	The product is not financially viable in the initial years. Improvements in trust and willingness to pay, enabling higher premiums, or cross-subsidy from bundling with inpatient insurance could be options to improve sustainability.
	The average cost of each visit to the CARE health-care providers (clinic and CHWs) is less than half that of a visit to a public hospital in India. <sup>4</sup>	The model delivers primary health care at lower cost to clients.
Renewals	The programme experienced 23 per cent renewals. Policies with at least one claim were approximately three times more likely to be renewed than policies with no claims. As the claim ratio for policies increases, renewals also increase.	Utilization in the first year increases likelihood of policy renewal. It impacts renewals more than variations in premium or coverage period.

## II. USE OF TECHNOLOGY

	Findings	Inferences
Functional efficiency	Hand-held devices (HHDs) enabled real-time data transfer between CHWs and the clinic, which were used to monitor the performance of CHWs and to create an electronic patient and insurance database. This made monitoring more efficient than with paper-based record keeping.	Technology can be instrumental in establishing efficient monitoring and data-keeping systems.
	The decision support system (DSS), available on HHDs, guides CHWs in recording patient history, supports diagnosis and consultation and prompts consultation with a doctor if necessary. This helped to standardize CHW consultation and establish a process for village-based care seeking.	DSS, used to institute a methodical approach towards patient consultation and diagnosis, might improve the quality of care in the long term.

<sup>3</sup> CHWs are the frontline of public health-care provision in developing countries. They are selected from the community and provide basic health and medical care. There is evidence which shows that CHWs can significantly improve the health of the population, particularly in those settings with the highest shortage of motivated and capable health professionals. (Zulfiqar A. Bhutta et al: *Global Experience of Community Health Workers for Delivery of Health Related MDGs: a Systematic Review, Country Case studies, and Recommendations for Scaling Up* (Geneva, WHO, 2010).

<sup>4</sup> Even though public health care is free, with high absenteeism, absence of consumables and transportation cost the out-of-pocket expense for households to access care is high; see N. Chaudhury et al: "Missing in action: Teacher and health worker absence in developing countries", in *The Journal of Economic Perspectives* (2006, Vol. 20, No.1) pp. 91-116.

## II. USE OF TECHNOLOGY

Financial efficiency	HHDs form 34 per cent of total initial set-up costs of the programme. Low-end mobile phones are cheaper than HHDs, but have less functionality.	HHDs, while expensive, offer important functionality. Because DSS and real-time data sharing are not possible via mobile phones, service quality and efficiency may suffer. The programme could explore alternatives such as cheaper smart phones with similar functionality to HHDs.
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## III. BUSINESS CASE

	Findings	Inferences
Viability	The reliance on subsidies to meet operational expenses decreased modestly from 94 per cent in the first year to 81 per cent by the end of the fourth year.	Long-term subsidies may be required to support a primary care delivery programme in remote rural areas.
Cost-efficiency	For every US\$1 spent on operations, CHWs generate \$0.50, compared with \$0.19 generated by the clinic.	Primary care delivered by CHWs is more cost-efficient than care delivered at the clinic, but both are far from breaking even.
Revenue sources	Sale of preventative health-care products represents 43 per cent of the total revenue of CHWs.  The programme can achieve break-even in 5 years if footfall improves so that at least 50 per cent of outpatient encounters in the villages and at least 5 per cent of outpatient encounters in Yavatmal town are with CHWs and the clinic, respectively.	Sale of preventative products in addition to health-care provision, can contribute to the financial viability of the model.  Both points of care need to reach a threshold footfall for programme viability.  The clinic needs to increase patient visits from the town.

The model has met its primary objective of providing access to primary health care at low cost to rural clients, albeit with dependence on subsidy, and has demonstrated that outpatient insurance facilitates access to health care and increases care-seeking behaviour. However, the model is far from achieving financial viability, because operational expenses exceed revenue from all sources. Nevertheless, because of its ability to improve access, the model should be considered as a promising option to complement existing health-care infrastructure.

## 1. BACKGROUND AND OBJECTIVES

With funding and support from the Microinsurance Innovation Facility at the International Labour Organization (ILO), the CARE Foundation collaborated with CIRM to design a health-care programme, marketed as the CARE Arogya Card. The programme was designed to address two challenges faced by low-income households: lack of access to affordable primary health care and high out-of-pocket health expenses. The solution they devised was an outpatient health insurance product,<sup>5</sup> delivered through a telemedicine-supported,<sup>6</sup> primary care model based on the use of community health workers (CHWs),<sup>7</sup> with a clinic as the hub at the back end. The impact of the outpatient insurance product on clients was assessed through a randomized controlled trial (RCT) impact evaluation, whose results<sup>8</sup> are summarized in section 3 (on value proposition).

### Box 1. The model

The programme is run through a rural, hub-and-spoke model, with a central primary care clinic and telemedicine-based decision support system (DSS) at the back end supporting a network of CHWs (who also sell insurance). The CHWs are connected to the doctor at the primary clinic through two possible channels, a mobile phone or a hand-held-device (HHD), which support telemedicine-based consultation and medicine provision. The CHWs also sell preventative health-care products, such as mosquito nets, soap and water-purifying tablets, in their village.

5 An outpatient is a patient who is not hospitalized for 24 hours or more but visits a hospital, clinic, or associated facility for diagnosis or treatment.

6 In this context, telemedicine can be explained as remote consultation provided by doctors to community health workers in the village through hand-held devices and mobile phones.

7 World Health Organization definition of CHWs: They should be members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of its organization, and have shorter training than professional workers. [http://www.who.int/healthsystems/round9\\_7.pdf](http://www.who.int/healthsystems/round9_7.pdf)

8 A. Mahal et al.: *What is a health card worth? An evaluation of an outpatient health insurance product in rural India* (Geneva, Microinsurance Innovation Facility, International Labour Organization, Research Paper No. 30, 2013).

The paper has the following objectives:

1. to assess the value proposition of the programme to clients;
2. to review the performance of the outpatient insurance product, taking into account the contextual factors affecting the product and the model;
3. to review the application of technology in the model; and
4. to explore the business case for providing insurance through this model.

### Box 2. The product

The insurance product provides outpatient insurance to a family of four (two adults and two children) at a premium of 300 Indian rupees (INR) (equivalent to US\$5) for 1 year, with unlimited visits to the CHW and clinic up to a sum assured of INR2,500 (\$42). As is common in pilots, the product features were modified following field testing. In the second year, the sum assured was reduced to INR1,500 (\$25) and the product allowed the enrolment of any four members of the family, instead of two adults and two children. The insurance covers consultations and medicines, but diagnostic services are excluded.

## 2. METHODOLOGY

Mixed methods were used to analyse primary and secondary data. Semi-structured interviews were conducted in five villages with CHWs and the target population, to identify and understand challenges in implementation and to capture respondents' feedback. A review of secondary literature was conducted, to learn from global and national experience with CHW- and telemedicine-based programmes.

Section 3, on value proposition, summarizes the findings of the RCT impact evaluation, undertaken between 2008 and 2012. In section 4, key performance indicators (KPIs) of the insurance product were reviewed using secondary data from the programme's management information system (MIS). Section 5 discusses the use of technology in the programme. In section 6, which covers the business case, financial and sales data including profit and loss statements and sales volume from four years (2009 to 2012), were reviewed. A forecast model, based on historical data, was developed to understand the future potential of the model to achieve sustainability. The paper then summarizes the findings, identifies key recommendations for the model and valuable lessons for the sector, and concludes.

### 3. VALUE PROPOSITION

We summarize the key client-level findings from the impact evaluation conducted for this programme.<sup>9</sup>

1. The product gave community members incentives to seek health care. Compared to households who only had access to the CHWs through a fee-for-service payment, the insured group made consistently higher use of health-care services, both in terms of visits to CHWs and as a ratio of visits to CHWs compared to visits to all providers.
2. There was a significant decrease (\$9.5) in hospitalization expenses and days spent in hospital (0.6 days) during a 6-month recall period for the insured group.
3. The insured group with subsidized access to preventative products had significantly fewer days of illness (2 to 3 days) for a 1-month recall period.

It was inferred in the impact evaluation that the insurance product provided policyholders with an incentive to visit the CHWs frequently, resulting in earlier identification of illnesses and more timely referrals to hospital, where the patient could get treated earlier in the episode of illness and therefore at a lower cost. When combined with the preventative products, insurance further reduced hospital admissions and expenses. For the patient, insurance improved access to primary care, and reduced morbidity and out-of-pocket expenditure.

The evidence suggests that the outpatient insurance provided through this model has the potential to make primary health care more accessible for clients. In this context it is relevant to analyse the financial performance of and business case for the model, to complement the above-mentioned evidence.

### 4. KEY PERFORMANCE INDICATOR (KPI) ANALYSIS

The objective of this KPI analysis is to evaluate the outreach of the outpatient insurance (based on coverage and renewal ratios) and its client value to the target population (claim ratio and incidence). The analysis covers two years, from 2010 to 2011.

<sup>9</sup> A. Mahal et al.: *What is a health card worth? An evaluation of an outpatient health insurance product in rural India*, Research Paper No. 30, op cit.

### 4.1 COVERAGE RATIO

The coverage ratio is the proportion of the target population enrolled in the microinsurance scheme.

*Hypothesis:* The model will achieve higher enrolment than the 5 per cent experienced in voluntary private health insurance schemes in India.<sup>10</sup>

- The programme assumed that outpatient products would provide greater and more frequent tangible benefits and would therefore have greater take-up than traditional inpatient hospitalization products.
- Additionally, the high cost of outpatient care, usually paid for by patients themselves, suggests that insurance, which makes costs more predictable and affordable, would be valued.
- It was expected that high premium discounts (up to 80 per cent) would help increase enrolment.

Table 1. Coverage ratio

Year	Total target population (number of individuals)	Total enrolled population (number of individuals)	Coverage ratio (%)
2010	52 358	3038	5.8
2011	52 358	2514	4.8

*Findings and discussion:* The above-stated hypotheses were more optimistic than the experience. In each of the 2 years reviewed, the coverage ratio of the outpatient insurance was similar to that of private inpatient health insurance across India.

*Of the total enrolled households in the first year, 46 per cent were given premium discounts of up to 80 per cent of the premium. Product pricing should be reevaluated based on perceived value and affordability to achieve similar or higher take-up in the absence of premium discounts.*

Furthermore, penetration decreased in the second year, for two possible reasons:

1. Premium discounts were reduced from 80 per cent to 25 per cent; and
2. The sum assured was reduced from \$42 to \$25.

<sup>10</sup> K.S. Reddy et al.: *A critical assessment of health insurance models in India* (New Delhi, Public Health Foundation of India, 2011).

Table 2. Flexible premium payment options

	Premium	Sum assured	First year policies	Renewals (%)	Second year, new policies
Monthly product: Monthly premium instalments (12-month policy)	\$0.5 per month for 12 months (total \$6)	\$42 (if clients miss one instalment, they can't access benefits until they have paid all premium in arrears)	159 (offered only for four months)	18	Not offered because of low persistency
6-month product: Single premium paid up front (shorter policy period)	\$2.5	\$21 in first year and \$12.5 in second year	24	29	362
Annual product: Upfront premium for 12-month policy	\$5	\$42 in first year and \$25 in second year	546	24	91

To further understand the reasons for lower than expected penetration, we look at supply- and demand-side factors that affect coverage ratio and that were identified during interviews with CHWs, beneficiaries and programme staff.

#### 4.1.1. SUPPLY-SIDE FACTORS AFFECTING COVERAGE RATIO

##### 4.1.1.1. DISCOUNTS

*Hypothesis:* Premium discounts in the first year create “familiarity” and induce higher enrolment.

Box 3. Addressing perceived value and affordability: Testing two discount strategies

- To ensure a more representative pool less affected by affordability concerns, in the first year, premium discounts of 80 per cent were offered to randomly selected households prior to actual sales.
- To test whether perceived value in the first year affected take-up, in the second year, discounts were offered through a random draw during enrolment but were reduced to only up to 25 per cent of the premium; second-year discounts were only offered during the sales process and not during the marketing phase.

*Findings and discussion:* Insured households who had been offered a premium discount constituted 46 per cent of total enrolment in the first year and 41 per cent in the second year. The decrease in enrolment in

the second year was expected, given the smaller discounts on premiums.<sup>11</sup> This is consistent with studies which have found that while discounts may increase enrolment, clients drop out after discounts are withdrawn, suggesting that premium discounts have a short term positive effect on penetration.<sup>12</sup> On the other hand, if there hadn't been any discounts initially, penetration might have been even lower. Thus, we infer that premium discounts are important in the initial years to familiarize the target population with the product and its benefits.

##### 4.1.1.2. FLEXIBLE PREMIUM PAYMENTS

The pilot experimented with flexible premium payments to test their effect on households' ability to pay and levels of trust.

*Hypothesis:* Flexible premiums will address liquidity constraints and should help to increase enrolment.

*Findings and discussion:* Even though, during a 4-month pilot period, sales surged for policies with monthly premium (instalments paid over 12 months), with six times more sales than policies with an upfront annual

<sup>11</sup> It is difficult to assess the impact of discounts on purchase decision in the second year as discounts were offered during enrolment and households could have already decided to purchase, with discounts being a secondary consideration. We also don't know if any households changed their decision to buy if they didn't win discounts in the draw.

<sup>12</sup> A. Fitzpatrick et al.: *Microinsurance utilization in Nicaragua: A report on the effects on children, retention, and health claims*, Research Paper No. 5 (Geneva, Microinsurance Innovation facility, International Labour Organization, 2011).

payment offered simultaneously, they experienced low persistency (only 18 per cent renewed in the second year) leading to an overall lower sale.

In contrast, the 6-month policies were more successful than the annual premium product in both respects. In the first year, sales of the 6-month product were low but in the second year, its sales overtook those of the annual product, as almost four times more policies were sold. Its renewal rate was also highest among the three types of product. But the first year enrolments of the 6-month product were too low (24 policies) to derive any meaningful inference about the renewal rate. Thus, while we cannot comment on renewals, we infer that products with both types of features - a shorter policy period or monthly premium instalments leading to lower upfront premium contribution - will have higher enrolment. However, among strategies, shorter policy periods are preferable to more frequent premium instalments, where the lapse rate is high.

*Products allowing premium instalments have higher enrolment rates than those which require full payment of the premium up front.*

*Two factors could drive this:*

- Lower but recurring payments relieve liquidity constraints.*
- These payments allow clients to try a new and untested product for a lower initial cost.*

#### 4.1.2. DEMAND-SIDE FACTORS AFFECTING PENETRATION RATIO

##### 4.1.2.1. DISTANCE FROM URBAN AREAS

The programme was launched in 47 villages within a 33-km radius of the town of Yavatmal, the urban centre of the region.

*Hypothesis:* Residents of villages located within a radius of between 5 and 15 km of the clinic will be most likely to enrol as they would save money by not having to travel frequently to Yavatmal for outpatient services, but still be close enough to get to the clinic if necessary.

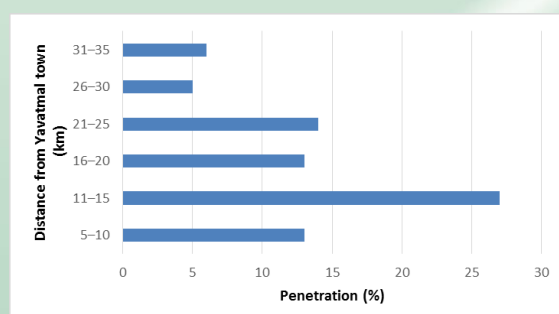


Figure 1. Penetration and distance from urban areas

*Findings and discussion:* The hypothesis holds true, as the penetration in villages situated 11 to 15 km from town is highest (at 27 per cent of village population enrolling). Penetration decreases to 5-6 per cent in villages situated more than 25 km from town. We observe that penetration is highest in villages which are neither too close to the clinic nor too far from it. As penetration decreases beyond 25 km, it might be preferable to create a new "hub-and-spoke" unit. Villages more than 25 km from the clinic have low penetration, possibly due to the inconvenience and cost of travelling to access services in Yavatmal.

*A radius of 11 to 25 km seems appropriate for one 'hub-and-spoke' unit.*

The programme was not launched in villages within 5 km of the town, because residents access primary care from other more established providers in the town.<sup>13</sup>

#### 4.2 CLAIM INCIDENCE

Claim incidence is defined as the total number of claims divided by the total number of insured individuals, expressed as a percentage.

*Hypothesis:* Claim incidence is expected to be low in the first year, as CHWs become established as reliable and trusted providers. However, with increased familiarity in subsequent years, trust could improve, leading to more visits to the CHWs.

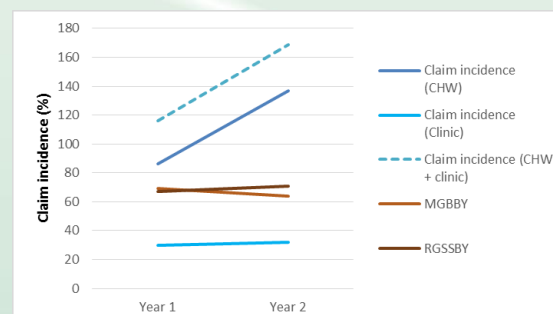


Figure 2. Claim incidence

*Findings and discussion:* We compared the claim incidence for the CARE outpatient insurance product with that of two large public insurance schemes with outpatient benefits: the Mahatma Gandhi Bunkar Bima Yojna (MGBBY) and Rajiv Gandhi Shilpi Swasthya Bima Yojna (RGSSBY) schemes for weavers and artisans respectively.<sup>14</sup>

<sup>13</sup> There is one government hospital and eight private hospitals in Yavatmal. These provide primary, secondary and tertiary health care.

<sup>14</sup> The Mahatma Gandhi Bunkar Bima Yojna (Mahatma Gandhi Weavers Insurance scheme) and Rajiv Gandhi Shilpi Swasthya Bima Yojna (Rajiv Gandhi Artisans Health Insurance Scheme) cover 4.83 million and 2.41 million lives



As is seen in Figure 2, the total claim incidence of CARE's programme (169 per cent, clinic + CHW) is much higher than the incidence in both the Weavers and Artisans insurance schemes (64 and 71 per cent, respectively). We interpret the higher incidence as being due to the proximity of CHWs to beneficiaries, which enables access to care without any additional transportation costs. The increase in incidence of care by CHWs suggests an encouraging trend of growing trust in CHWs among patients.

*Claim incidence for CHW care almost doubled over 2 years. As care provision by CHWs is economical for the programme, these are important results for programme viability.*

### 4.3 CLAIMS RATIO

Claims ratio is defined as the incurred claims in a period divided by the earned premium for the same period.

*Hypothesis:* In comparison with other outpatient pilots in India, like the Weavers and the Artisans schemes, CARE's model will experience a higher claim ratio in the initial years, owing to frequent use of outpatient benefits, which are easy to access from the CHW.

*Findings and discussion:* The product has experienced a claims ratio of 139 and 148 per cent in the first and second years, respectively. While the product might be providing value to its clients, it is unsustainable at such high claims ratios. However, it has potential if bundled with inpatient insurance. Outpatient insurance may reduce morbidity through more timely diagnosis and treatment and/or early referrals.<sup>15 3</sup>

We further analyse claims ratio according to the type of services insured.

*With its current claims ratio, the product is not sustainable.*

- *The premium could be increased, as seen in the 6-month product, without affecting take-up.*
- *Also, the claims ratio might be a reflection of high pent-up demand present during the pilot years, leading to lower claims ratios in the future.*

#### 4.3.1. TYPE OF INSURED SERVICE

We analysed the distribution of average claim costs based on two types of covered medical services: consultation and medicines.

*Hypothesis:* For the programme, medicines dispensed by CHWs could represent proportionately higher out-of-pocket expenditure compared with consultations. At the clinic, the proportion of out-of-pocket expenditure for medicines relative to consultations is expected to be even higher, given that more complex cases, requiring costlier medicines, are referred to the clinic.

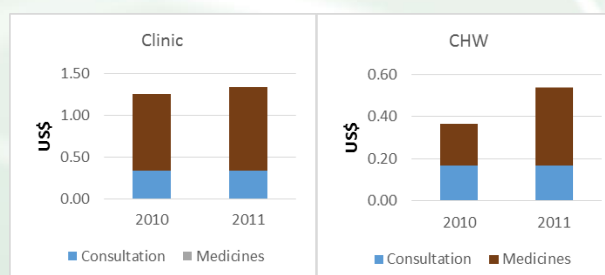


Figure 3. Distribution of average claim cost (US\$)

*Findings and discussion:* Programme managers suggested that the increase in average out-of-pocket expenditure for medicines in the second year was due to a 40 per cent increase in drug procurement costs. However, the effect of such a price increase is not evident at the clinic. One possible explanation could be that, during the second year, the complexity of cases treated by CHWs rose, resulting in increased that, during the second year, the complexity of cases treated by CHWs rose, resulting in increased medicine

respectively, Year 1 refers to 2009-10 and Year 2 is 2010-11. While both schemes cater to specific target groups, i.e. weavers and artisans, due to large enrolment, their results may be regarded as indicative for the general low-income population. Claim incidence data of these programmes have been drawn from interviews with insurers and scheme advisers.

<sup>15</sup> The impact evaluation study found that outpatient insurance reduced both days spent in hospital and out-of-pocket expenditure for hospitalization (A. Mahal et al.: *What is a health card worth? An evaluation of an outpatient health insurance product in rural India*, Research Paper No. 30, op cit.).

#### Box 4. Discovering cost-efficiency and affordability with CHWs

*Access to care with low out-of-pocket expenditure is a key benefit of the programme:* This cost-efficiency is driven by the CHWs servicing a large percentage of the patients at low cost. Each encounter with the CARE health-care providers (clinic and CHWs) costs patients less than half the cost of a visit to a public hospital. The average per visit expenditure of \$0.70 for the CARE Foundation programme are lower than the \$1.57 incurred at public hospitals (Table 3).

Table 3. Average out-of-pocket expenditure per outpatient visit, CARE Foundation programme vs public hospitals, by type of client in 2011(US\$)

Type of client	CARE Foundation			Public hospitals
	Clinic	CHW	Weighted average	
Insured	1.33	0.54	0.69	--
Non-insured	1.69	0.53	0.72	--
Weighted average (insured and non-insured)	1.49	0.53	0.70	1.57 <sup>a</sup>

<sup>a</sup> Chatterjee S; Levin C; Laxminarayan R (2013) Unit cost of medical services at different hospitals in India, PLoS ONE 8(7): e69728. doi:10.1371/journal.pone.0069728.

## 4.4 RENEWAL RATIO

Renewal ratio is an indicator of product value as perceived by clients.

*Hypothesis:* Renewals will be higher than experienced in inpatient health insurance schemes. It was assumed that a higher probability of benefit payouts with an outpatient product would lead to significantly more households experiencing a “tangible” benefit of insurance, thereby encouraging a higher renewal rate.<sup>16,14</sup>

*Findings and discussion:* At 23 per cent, programme renewals are similar to the rate of more mature and established inpatient health microinsurance schemes in the region (for example, Adamjee, Pakistan: 21 per cent; VimoSEWA, India: 22 per cent).<sup>17</sup> However, even costs for cases treated by CHWs. There is also a possibility that CHWs prescribed more medicines or more expensive medicines (or a combination of both) in the second year to respond to client demand. This requires further investigation.

though there was no specific estimate, renewals, being similar to a low-incidence product (inpatient insurance), are lower than anticipated for a high-incidence outpatient product.

We interpret a low renewal ratio to be a result of the first-year pilot. Trust is considered a cornerstone of effective provider-patient relationships in health care.<sup>18</sup> In this case, the health-care provider is also the insurance provider. As trust in the health-care provider develops, renewals may also improve.

We also investigated the impact and degree of utilization to identify ways of improving renewals.

### 4.4.1. IMPACT AND DEGREE OF UTILIZATION

*Hypothesis:* Utilization will improve renewals and clients with higher levels of utilization will be more likely to renew.

16 O. De Bock and W. Gelade: *The demand for microinsurance: A literature review*, Research Paper No. 26 (Geneva, Microinsurance Innovation Facility, International Labour Organization, 2013).

17 P. Wrede: *The importance of renewals, and the benefit of customer loyalty* (Geneva, Aga Khan Agency for Microfinance, 2009).

18 R. Rowe and M. Calnan: “Trust relations in health care - The new agenda”, in *European Journal of Public Health* (Vol. 16, No. 1, 2006), pp. 4-6.

Table 4 Renewals and utilization in different products

Premium payment option	Renewal ratio (%)	
	Policies with no claims	Policies with at least one claim
Monthly	5	16
Annual	11	31
Total	10	27
Data not used for analysis		
6-month	21	0*

\*Data for the 6-month policies were not considered for the analysis because of small sample size (only three of 24 6-month policyholders had claimed), limiting the possibility of drawing reliable conclusions.

*Findings and discussion:* Not surprisingly the households which claimed at least once demonstrate higher renewals.

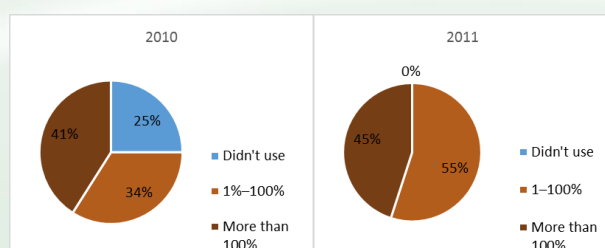


Figure 4. Distribution of policies according to claim ratios

As shown in Figure 4, in the first year 25 per cent of policies had no claims. In the second year, this went down to zero as all policies had claims. It is remarkable that all clients used their policy in the second year, suggesting a growing trust in and understanding of the product.

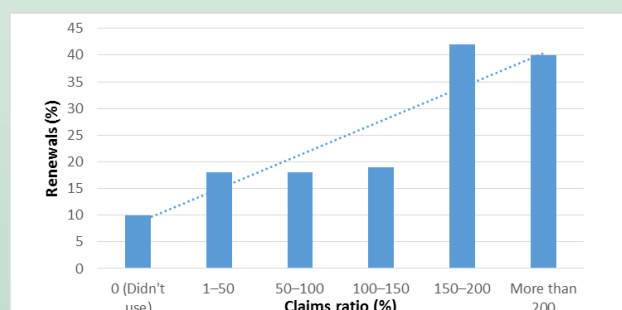


Figure 5. Distribution of policies according to claims ratio and renewals (2010)

Analysis shows that the renewal ratio increases as claims ratio increases. The policies with a claims ratio of more than 150 per cent had the highest renewals. A similar positive correlation is observed between the

renewal ratio and the claim incidence.<sup>19</sup> Claim costs, a key measure of client value, exceeded premium (i.e. the claim ratio was greater than 100 per cent) for 45 per cent of clients in 2011-12.

*-Utilization in the first year increases the likelihood of policy renewal. - Higher claimants tend to renew more.*

Box 5. KPI analysis: In summary

- Poor penetration and high claims ratios threaten the product's long-term viability.
- More utilization leads to more renewals, which is encouraging.
- The model's relative cost-efficiency offers it as a policy option for scaling rural primary health care.

## 5. USE OF TECHNOLOGY

CHWs were provided with a mobile phone from the start of the programme, and an HHD later on. The mobile phone and HHD both used the GSM<sup>20,18</sup> telecom network to facilitate delivery of telemedicine, supported by a medical DSS<sup>21,19</sup> and a database that integrates insurance, with medical diagnosis and treatment data. The mobile phone was used to call the doctor for every consultation, after the client data was shared with the doctor through the HHD.

<sup>19</sup> Policies which were renewed had double the claim incidence (10.4 visits per policy) compared to policies which weren't renewed (5.1 visits per policy).

<sup>20</sup> Global system for mobile communication.

<sup>21</sup> The DSS was prepared by referring to the WHO's DSS for such systems. It worked on the basis of information submitted by the CHW and either provided a prescription or prompted referrals to the doctor.



Use of HHDs was stopped after 8 months.<sup>22</sup> Thereafter, only mobile phones were used. Thus, while the introduction of technology was planned in two phases - initially mobile phones, then HHDs - the discontinuation of HHDs resulted in a third phase with a return to using only mobile phones. However, no software was developed to provide treatment modules or to compile a real-time database via the mobile phones. Hence, CHWs had to call and narrate the information to the doctor. We make a comparison between the main features of the mobile phone and the HHD technologies used in this programme.

#### Box 6. Applications in the hand-held devices (HHDs)

The HHDs had the following applications:

- Unique biometric identification of clients and CHWs to reduce fraud.
- A 'standard treatment protocols' application. This was developed by CARE Foundation and calibrated with World Health Organization's global standards for outpatient treatment protocols. The 'protocol-based treatment' module helped the CHWs to document patients' medical history. (See Annex 5 for more details.)
- Health data management. The HHD was linked to the clinic's central database to permit real-time sharing of patient history, enabling the doctor at the clinic to send prescriptions for CHWs to dispense medicines to the patient.
- Insurance data management. This facilitated cash collection and management, and ensured transparency.

Table 6. Devices used

		
Description of device	Hand-held computing device with a display screen and touch input, biometric reader and printer, and weighing less than 1 kg	Standard mobile phone
Software	ImpelCARE (SaaS-based <sup>1</sup> front-end and back-end software with a DSS and insurance database)	Standard Symbian operating system but no health-care-related software developed for the project
<p><sup>1</sup>SaaS (Software as a Service) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the internet.</p>		

<sup>22</sup> The HHDs frequently failed to read biometric identification. Their connectivity was unpredictable and batteries had to be charged every day, which was difficult in remote villages with an intermittent power supply.

Based on service and performance criteria, we make a comparison of the three phases of technology

intervention and summarize key lessons (Table 6).

Table 6. Devices used

Component	Phases 1 & 3: Mobile phone only	Phase 2: HHD + mobile phone	Key lessons
Programme description	Implemented at the launch of the programme (2009) until July 2012 in 40 villages and after February 2013, when HHDs were withdrawn.	Implemented for 1 year (July 2012 to February 2013) in 30 villages.	Major challenges in the use of HHDs were faced in biometric identification, network connectivity and charging the battery of the device.
Biometric identification	Not available. Unique identification not possible. It was assumed that CHWs were based in the village, and could identify clients. This implied less dependence on biometric identification.	Available through HHDs. a) Only the CHW can operate the device. b) Beneficiaries can be uniquely identified.	a) Programme dependence on biometric identification may lead to delayed or denied service, owing to error in identification. Biometric devices do not recognize worn fingerprints easily. <sup>a</sup> b) Collusion between CHWs and clients cannot be easily identified or avoided in the absence of biometric identification.
DSS for the CHW	Not available. The CHW calls the doctor at the clinic to share information and seek guidance.	Available. A protocol-based treatment module prompts the CHW and supports her to provide a diagnosis. The DSS indicates when the doctor should be consulted.	a) DSS protocols are helpful for training new CHWs. b) DSSs strengthen perceptions among clients that CHWs are professional health-care providers.
Real-time data sharing with doctor at clinic	Not available. The CHW must narrate patient history over phone to the doctor.	Possible. Data entered by CHWs are digitally transferred in real time to the central system at the clinic. CHWs used phones to share supplementary information with the doctor.	HHDs improve communication, enabling real-time data sharing during patient encounters, including transfer of (a) diagnosis from CHW to doctor and (b) prescriptions from doctor to CHW.
Prescriptions	Transmitted orally by doctor to CHW, who informs patient.	Digitally transmitted to the CHW, who shares a printout with patients.	Printed prescriptions reinforce perceptions among clients that CHWs are professional health-care providers.
Patient database	CHWs manually record patient medical history on paper forms.	Documentation of patient medical history is standardized across all CHWs and digitally stored on the HHD.	Paper-based records lead to increased workload, as data have to be manually recorded at the clinic.  When mobile phones are used, the effectiveness and consistency of documenting patient medical history varies across CHWs and depends on individual skills and training.

Table 6. Devices used

Component	Phases 1 & 3: Mobile phone only	Phase 2: HHD + mobile phone	Key lessons
Performance			
User-friendliness	More user-friendly. Mobile phones were used only to make calls. CHWs are familiar with phones and use them frequently.	Less user-friendly. c) The HHD was a new technology and CHWs needed to get used to its functionality. CHWs were less receptive to HHDs.	Although HHDs were time-consuming and difficult for CHWs to use, there was an overall positive effect on programme efficiency through real-time data sharing, data recording and physical receipt issuance for the client.
Quality of care and efficiency	The efficiency of mobile phones depends on the communication skills and clinical competence of individual CHWs.	Documenting the client's medical history was facilitated through the DSS, allowing a more systematic approach. CHWs still called doctors for advice and prescriptions.	c) It is unclear whether HHDs improved the quality of care when used in combination with mobile phones. However, we do expect that the use of DSS on HHDs is more efficient because it allows processes and data collection to be standardized.
Transparency	Less transparent. Real-time data sharing is not possible.	More transparent. Digital data storage and real-time data sharing are possible.	In the absence of HHDs, monitoring becomes more complicated and costly and takes longer to perform, because records must be kept on paper. This is also more prone to errors.
Viability	High. Low capital cost at \$20 per mobile phone.	Low. High capital cost at \$740 per HHD and \$20 per mobile phone.	HHDs, while expensive, have very important functionality. The programme could explore alternatives such as cheaper smart phones to provide similar services to those offered by HHDs.
Reliability	Higher. Charging a phone for one hour enables 2-3 days use.	Lower. The HHD requires 2 hours of battery charging to function for 1 day.	Remote rural areas have erratic power supply, making mobile phones more reliable than HHDs.

a This is a common challenge with using biometrics in rural settings to support financial inclusion. See A. Gelb and J. Clark: *Identification for development: The biometric revolution* (Center for Global Development, 2013).

## 5.1. FUTURE USE OF TECHNOLOGY

Table 6 suggests that HHDs can improve the overall functional quality and efficiency of health care delivery through the use of DSS and real-time data sharing. While mobile phones are cheaper, they don't have as much functionality as HHDs. This can affect the quality and efficiency of service, because of the absence of a treatment protocol and of real-time data sharing. An important lesson for the programme is that the skills and familiarity of village-based workers with existing tools and technologies should be made use of before (or instead of) introducing new technology. The CHWs were more receptive to mobile phones, used routinely, than to the newly introduced HHDs. The programme could benefit from developing a mobile-phone-based standard treatment protocol and data-storage module, similar to the one available in HHDs. However, it remains to be seen how receptive CHWs would be to entering data on a smaller mobile phone keypad, and how successful they would be.

Development of mobile phone DSS software, similar to the program used with HHDs, is key to exploiting the benefits of both the technologies regarding service quality, and to some degree financial and functional efficiency. CHWs should be able to transfer their experience in using a DSS module on the HHD to using one on a mobile phone. Biometric identification can be incorporated onto a mobile phone using new technologies such as biometric identification Bluetooth devices.<sup>23</sup>

Box 7. Transitioning from HHDs to smart phones for viability

- Use of smart phones with the ImPel software and biometric identification, instead of HHDs, can reduce the initial set-up costs.
- Based on the present cost of low-end mobiles, a cost saving of \$21,976 can be achieved, which is 34 per cent of current set-up costs.
- However, since smart phones with comparable features are costlier than low-end mobile phones, the degree of cost saving may be lower.

## 6. BUSINESS CASE

In this section, we review the financial performance of the pilot programme from 2009 to 2012, in order to understand the business case for this delivery model.

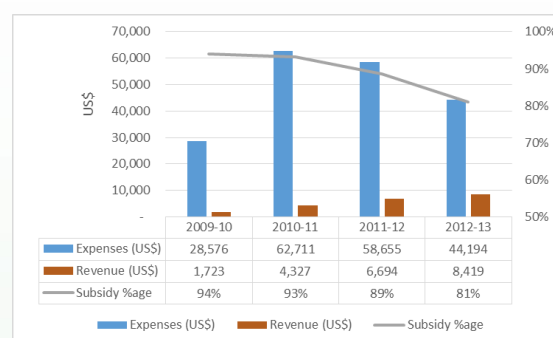


Figure 6. Financial performance of the program

*Findings and discussion:* Dependence on subsidy is gradually decreasing, from 94 per cent in the first year to 81 per cent in the fourth year, but remains high (Figure 6). In this section, we provide a breakdown of the cost and revenue. We calculate this at the two “points of care”, i.e. the two levels in this model where care is provided, namely the CHWs and the clinic. It is therefore essential to compare the costs they generate and the revenue they bring in, to understand the model better and to identify opportunities to improve efficiency at each level. This also provides insight into identifying areas of profitability and scalability for each point of care.

Building trust among a local population for health-care services takes time. With a slow increase in utilization, financial viability is delayed. This model requires the target population to be assured of the quality of care being provided by CHWs. As CHWs have reported in interviews, the telemedicine component, where they connect with qualified doctors at the back end during each consultation, has been helpful in this regard. While there is no clear causal linkage, the exceptional growth of revenue, by 388 per cent in three years (Figure 6), could be attributed to improved trust in the quality of the programme, and regarded as an indicator of increasing acceptance by the target population.

For further analysis, we explore factors which could improve the business case for the programme. In the next sub-section, we compare efficiency and costs as well as revenue at the two points of care.

*Revenue has increased, growing fivefold in three years. This suggests a growing acceptance of CHWs as a source of primary care and preventative products.*

### 6.1. BUSINESS EFFICIENCY OF CHWs AND CLINIC

Operational efficiency, defined as revenue per unit of operational expenses, is used to indicate future

23 A Bluetooth device consists of a small printer and biometric card as well as a finger reader. It can be linked to the mobile phone using Bluetooth technology.

profitability and business efficiency, or the ability to generate maximum revenue at minimum expense.

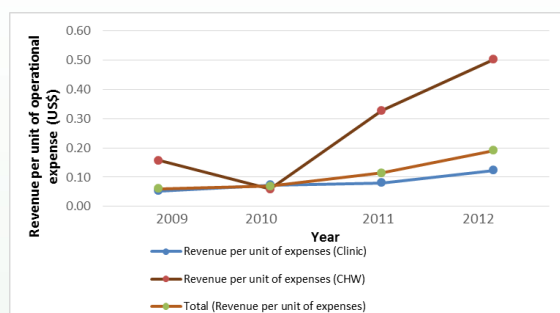


Figure 1. Revenue per unit of operational expense (US\$) at two points of care

Although there has been a gradual improvement in overall efficiency, the programme will continue to depend on subsidies for some time. The key feature of this model is to build local capacity by training mostly rural women to provide low-cost health care that also generates revenue. This has resulted in the CHWs being more cost-efficient than the clinic. However, it is to be noted that this comparison is not ideal, as the clinic cost represents part of the overall model costs, thus cross-subsidizing the costs of the CHW. Also, like the clinic, the CHWs are far from achieving break-even. Even though the clinic appears to reduce the overall efficiency, it provides critical administrative support to the model and helps build a perception of quality among clients. It is important for the viability of the model that both the components (clinic and CHWs) perform well.

### 6.1.1. FACTORS CONTRIBUTING TO BUSINESS EFFICIENCY

We compared the average operational costs of the CHWs and the clinic, as well as the revenue they generated, over three years in order to identify the major sources of revenue and costs at the two points of care (Figure 8).

- Costs: Human resources (salaries) are the biggest cost category for the model, comprising 61 and 62 per cent of operating expenses for CHWs and at the clinic, respectively.
- Revenue: Consultations and medicines are major sources of revenue for both CHWs (52 per cent) and the clinic (26 per cent), though insurance premium is the highest revenue source (31 per cent) for the clinic. Furthermore, sale of preventative products such as soap, mosquito coils and water-purifying tablets is a prominent driver of revenue for CHWs (43 per cent of total CHW revenue). CHWs corroborated this finding. They consider that the sale of preventative products increases the number of client

interactions and improves loyalty among the villagers. Thus, 48 per cent of revenue from CHWs and 74 per cent of revenue from the clinic is from activities other than consultations and medicines. The programme has also experimented with the provision of other services such as periodic health camps and a chronic care programme.<sup>24</sup>

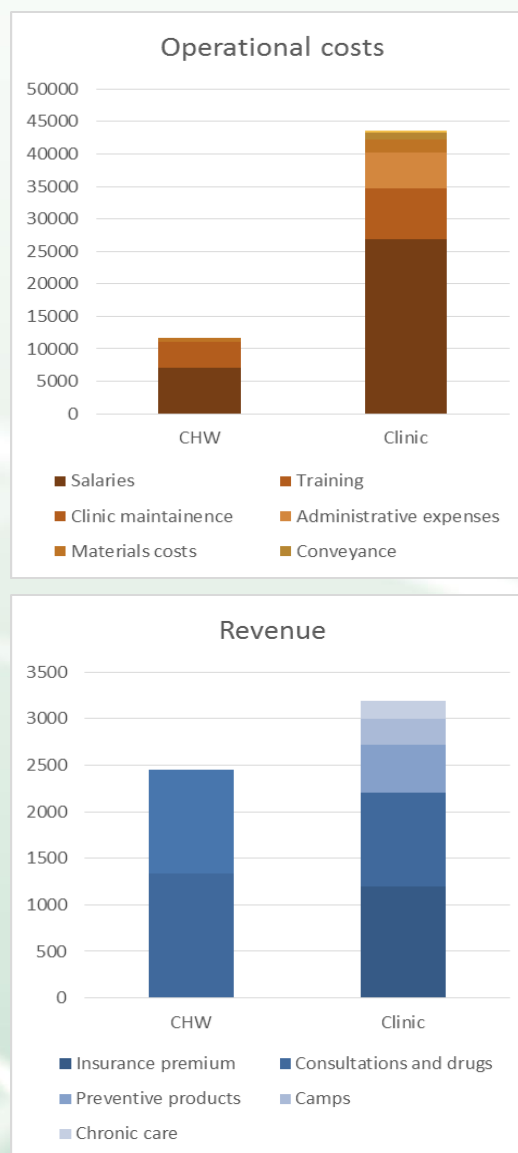


Figure 8. Average costs and revenue of clinic and CHWs (2010-12) (US\$)

<sup>24</sup> The chronic care programme caters to patients of diabetes and hypertension. The subscribers to this programme receive consultation and medicines at the clinic and CHWs perform routine checks on blood glucose and blood pressure levels in the village itself.



**Box 8. Building viability by providing more**

- In support of being a one-stop option for comprehensive primary health care, CHWs and the clinic sell various non-clinical products such as mosquito nets, soaps, masks, water-purifying tablets, sanitary napkins and prescription spectacles.
- In 4 years, the sale of these products has generated 23 per cent of total programme revenue.
- CHWs suggest that offering additional products such as pain balm, medicinal toothpaste and baby products would be helpful to increase revenue.

**Box 9. Building trust by providing more**

- The doctor, supported by a female nurse from the clinic, and with local coordination by the CHW, organizes health camps for check-ups and women's health.
- The camps not only increase revenue (12 per cent contribution) but also help to bring in new clients for the CHWs.

## 6.2. FORECASTING THE BUSINESS CASE

A forecast model was developed to identify possible pathways for this programme in the future (Annex 6). The model was prepared by identifying cost and revenue categories, and their drivers, for both the clinic and the CHWs. There are two key revenue drivers that could help achieve break-even:

1. the percentage of total outpatient encounters in the village with CHWs, and
2. the number of visits to the clinic.

Based on this, the forecast model informs the business case for the programme by identifying the key areas in cost and revenue categories which need to be addressed to improve financial viability.

The programme can break even in 5 years if it meets the following conditions:

- 50 per cent of those seeking outpatient care in the villages visit the CHWs
- the clinic is able to acquire about 5 per cent of outpatients in Yavatmal town

**Box 10. Forecasting the future**

- The assumptions
- Insurance penetration will reach 10 per cent and remain stable.
- One-fifth of patients visiting CHWs will be referred to the clinic.
- Outpatient incidence in the villages will be 100 per cent per year, but not all encounters will be with CHWs.
- The key finding
- While provision of additional products and services (preventative products and health camps) improves the business case, the programme cannot become self-sustainable unless there is an increase in the number of encounters with the CHWs and visits to the clinic.

The clinic will need to hire additional health-care staff to service these patients, but the incremental revenue should justify the costs.

## 7. CONCLUSION AND RECOMMENDATIONS

We summarize the key recommendations for the model based on the analysis so far, then we summarize the valuable lessons from the experiment for the primary health care sector.

### 7.1. IMPROVING THE PROFITABILITY OF THE MODEL

- The CHWs should achieve break-even in the long term, but may not be able to cross-subsidize the clinic's high operational expenses. The clinic is not yet a preferred choice for residents of Yavatmal town and depends on referrals from CHWs for patients. The clinic needs to increase its revenue and reduce its operating expenses. More awareness in the town could improve footfall at the clinic.
- With the programme graduating from research and design to an operational phase, there can be leaner staffing at the clinic to reduce the high expenses for salaries.
- Sale of preventative products is a key driver of revenue. Based on demand and CHWs' feedback, additional products could be added to the CHWs' portfolios. This will help to establish the CHWs as a one-stop shop for consultations, medicines and preventative products.
- Specialized health camps, such as ophthalmic and geriatric care camps, should be organized to improve awareness of the programme and the local CHWs. Camps increase a CHW's credibility

in the village and help them acquire new clients. The chronic care programme, which caters to patients with diabetes and hypertension, has not been as successful as expected. According to doctors, patients prefer to visit brick-and-mortar facilities, which convey to them greater medical expertise. Investment in the chronic care programme should be re-directed towards health camps.

- Developing a mobile-phone-based software, similar to the HHD software, will reduce the capital expenses required to link CHWs to the hub clinic and will enable the use of the DSS module to improve viability while supporting the delivery of good-quality health care. A protocol for calls can also be established, which will help in standardizing communications between CHWs and the clinic.

## 7.2. EXPANDING THE PROGRAMME

- The CHW component of the model is more efficient than the clinic as it doesn't bear administrative costs, but it remains far from breaking even. It is not possible to expand the model sustainably, owing to high operational costs. One possible solution would be to adopt a variable salary component for CHWs, to incentivize productivity.
- Future expansion can occur with reduced costs. According to CARE Foundation's programme manager, a low-cost replicable hub-and-spoke model can be created by contracting with external providers for diagnostic services and increasing revenue generating activity of CHWs.<sup>25</sup> In this model, CHWs' initial set-up costs would be paid by a loan rather than through programme funding. This would help in scaling up the programme as less capital would be required.
- Clients prefer smaller premiums and shorter policy duration. Future products should focus on 6-month policy periods, which have demonstrated higher take-up.
- Since geographical distance from the clinic affects product enrolment, strategies to increase penetration beyond a distance of 11 to 25 km from the clinic should be deployed. However,

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26 A back-of-the-envelope calculation by the programme manager suggests that a model spread across 100 villages with operational expenses capped at \$30,000 might be optimal. The programme needs to invest further in ratifying and developing an informed business plan. Loan-based funding of CHWs' initial set-up costs could reduce the time required to achieve break-even.

high set-up and operating expenses for a clinic are a major challenge for expansion. Alternatively, other existing private health-care facilities near such villages could be contracted as service providers.

## 7.3. FINDINGS AND RECOMMENDATIONS FOR THE SECTOR

The model has demonstrated that the challenge of human resources for health can be addressed and substantial client value can be provided through providing CHWs with technology-based clinical support and supervision systems. We summarize the valuable lessons from the experiment.

### 7.3.1. CHWs CAN HAVE AN IMPACT ON ACCESS TO HEALTH CARE

Approximately one-sixth of the world's population is affected by a shortage of qualified health workers.<sup>26</sup> In this context, there is a growing interest in using local human resources such as CHWs to improve access to health care. CARE Foundation's model has provided evidence that the deployment of CHWs with outpatient insurance gives people incentives to seek health care, decreases the number of days spent in a hospital and reduces out-of-pocket expenditure for hospitalization.

### 7.3.2. CHWs AS A VIABLE LOCAL POINT OF CARE

The model has demonstrated that CHWs can provide multiple health-care-related services in the village.<sup>27</sup> This proximate, single point of care, for both curative and preventative care, increases the value for the client in this model. The fact that CHWs are more comprehensive providers of care also increases footfall and makes them more viable.

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26 P. Moszynski: "One billion people are affected by global shortage of healthcare workers", in *BMJ* (2001, 342:d696).

27 Such as telemedicine-assisted primary care, medicines, diagnostic tests, non-clinical preventative products and health insurance.

### 7.3.3. REAL POTENTIAL FOR SCALE-UP BY LEVERAGING EXISTING CHW NETWORKS

India has a network of more than 323,000 CHWs.<sup>27</sup> This programme demonstrates one possible strategy to leverage this network. Using this network wouldn't require the deployment of additional CHWs, and could thus enable rapid and cost-efficient scale-up.

### 7.3.4. MAKE GOOD USE OF TECHNOLOGY

CHWs are most effective when linked with local primary care systems and supported and supervised by a clinically skilled health workforce.<sup>28</sup> CARE Foundation's model uses technology to form such linkages. Use of technology (a) facilitates health-care delivery by linking CHWs to doctors through telemedicine; (b) improves the quality of care by helping CHWs make decisions (via DSS), improving the accuracy of health data, and making data collection more efficient; and (c) improves cost-efficiency by enabling real-time data sharing and low-cost supervision.

### 7.3.5. DON'T IGNORE CONTEXT-SPECIFICITY

Successful design of a community-based health intervention requires context-specificity. Technology should take account of existing skills and preferences in the target population. The model should consider infrastructure limitations such as distance from urban areas and electricity provision.

## 7.4. CONCLUDING REMARKS

This model has been able to meet the objective of providing access to primary health care at low cost to clients. With the introduction of outpatient insurance, it has provided people with incentives to seek health care and enabled remote rural households to access medical services.

Considering the need for inclusive health-care financing and delivery channels, the ability of the programme to improve access should be recognized. Developing countries have been experimenting with various models of primary care delivery to improve access in remote areas. In such a scenario, this CHW-leveraging telemedicine model should be regarded as a promising way to deliver primary health care.

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27 UNICEF: *What works for children in South Asia: Community health workers* (Kathmandu, Regional Office for South Asia, 2004).

28 CHW Technical Task Force: *One million community health workers: Technical task force report* (The Earth Institute, Columbia University, 2013)

## ANNEX 1. SNAPSHOT OF CARE FOUNDATION'S HUB-AND-SPOKE PRIMARY CARE MODEL

Table A1. Details of programme features

Programme feature	Details
Number of active CHWs	35
Number of health-care staff at primary care clinic	2 (1 doctor and 1 paramedic)
Number of administrative staff at clinic	6 (1 project manager, 1 inventory manager, 1 accountant, 2 CHW coordinators, 1 MIS & microinsurance executive)
Medicines available from CHWs (included in coverage for insured clients)	Medicines for fever, dysentery, cold or cough; analgesics; and iron and protein supplements
Diagnostics by CHW	Haemoglobin and blood glucose
Preventative products sold by CHW	Water purifying-tablets, mosquito coils and nets, soaps
Services available at the clinic	Consultation and diagnostics (x-ray and ECG)
Combined medical services by CHW and clinic	Village health camp (8-10 per month) Female health camp (8-10 per month)

Table A2. Outpatient insurance details

Characteristics	Details
Sum assured	\$42 (first year) and \$25 (second year)
Benefits	Unlimited visits to CHW and clinic Free generic medicines Subsidies on brand medicines

## ANNEX 2. PROFILE OF A CHW

### Who is a CARE Foundation CHW?

Every morning, Lata Bhagwan Thakre wakes up early like other women in her village. After finishing routine chores, by 10 am she leaves for the village community building. Here, her day begins as the CHW of the CARE Rural Health Mission. The local panchayat has provided her with a small room in the community building, which she uses as a primary care clinic. Patients visit her, seeking medicines for common illnesses such as fever, cold, dysentery and body ache. After working for two hours, she leaves for her daily door-to-door visits to bedridden patients. The rest of her day is spent treating patients who visit her house to avail themselves of her services as a CHW.

As a graduate in humanities, she is among the well educated, like most CHWs. She has been serving her village of Talega for two and a half years and was encouraged by her in-laws to apply to become a CHW.



Lata attends to four to five patients every day and makes regular house calls. She feels that if the programme stocked pain balms, cough syrups and mouth ulcer ointments she could sell even more products. Her husband is an agricultural labourer and together their monthly income is about INR5,000 (\$100). She earns approximately INR1,500-2,000 (\$30-40) per month. Her motivation in joining the programme was to have an alternative source of income while helping fellow villagers who routinely suffer from lack of health-care services in the village. As she left for a house call, she said, "At the end, it is the satisfaction of serving my village which drives me every morning."

### ANNEX 3. CAPITAL EXPENSES FOR CHWS AND CLINIC

Since the clinic also houses the programme management team, an exact comparison of the costs of the two points of care is not possible. The clinic costs should be divided into overall programme management and care delivery costs. In the absence of this division, the comparison is skewed, making the clinic care delivery cost look much higher than it actually is.

As expected, capital costs are higher for the clinic than the CHWs (see Table A3). At the clinic, initial set-up<sup>29</sup> was the highest cost, followed by IT<sup>30</sup>. As discussed in the technology section, the programme now uses only mobile phones instead of both mobiles and HHDs. While HHDs are costly, the present cost of mobiles is not a good comparison as smart phones would be the preferred mobile option since they offer similar functionality to HHDs. Thus, the programme will have to reevaluate its options while scaling up, based on the affordability and functionality of various technologies.

Table A3. Capital expenses (US\$) and percentages of total for the two points of care

Clinic			CHW		
Cost categories	Expenses	%	Cost categories	Expenses	%
Clinic set-up	18,850	47	CHW kit <sup>a</sup>	1,178	5
IT set-up	17,954	45	Diagnostic kits	1,141	5
Diagnostics set-up	667	2	HHDs and cards	22,577	90
Conveyance	2,612	7			
	40,083	100		24,895	100

<sup>a</sup>CHW's kit contains apron, gloves, thermometer and blood pressure reader.

<sup>29</sup> Clinic set-up includes plumbing, electricity, water, furniture etc.

<sup>30</sup> Interestingly, at the programme level, considering all cost heads, IT set-up costs were the highest, constituting 62 per cent of total set-up costs.

## ANNEX 4. LIST OF MEDICINES AVAILABLE FROM CHWS

Table A4. Medicines available from CHWs

Serial no.	Medicines and products available from CHW	Medicines available at clinic and transported to CHW on request
1	Tab. Aceclowok-P	Tab. Moxfin kid
2	Tab. Wogene	Tab. Metrofin
3	Tab. Vit.B complex NFI	Tab. Floxnor
4	Tab. Finlax	Tab. Setride
5	Tab. Starlop (Lomotil)	Tab. Mefacid spas
6	Tab. Domifin	Tab. Chloroquine
7	Tab. Dicfin	Tab. Ciflavin
8	Tab. Dupacet	Tab. Altenol 25
9	Tab. Hemofol	Tab. Altenol 50
10	Tab. Ranfin	Tab. Altenol AM
11	Tab. Calcium lactate	Tab. Amifru
12	Tab. Pentawok	Tab. Diamet
13	Tab. Womox	Tab. Diasol
14	Cap. Zenovit	Tab. Albendazole
15	Merilyte powder	Tab. Levowok
16	Deeclogel ointment	Tab. Oflowok
17	Cantop - B / Fungitop - F	Tab. Vertizen
18	Syp. Starmol	Cap. Ospamox - 250
19	Syp. Genfol	Cap. Ospamox - 500
20	Syp. Zenobex Plus	Syp. Z - coff
21	Protimx (vit-supplement)	Syp. Onvin
22	Gentamicin eye-drops	Syp. O-Powercef
23	Zenobex drops	Syp. Sneezzy
24	Povidon solution	Syp. Woflox-OZ
25	Cotton	Syp. Wolkazer

26	Bed net
27	Mosquito oil
28	Handkerchiefs, gents
29	Handkerchiefs, ladies
30	Face mask
31	Needles
32	Gluko strip
33	Bandage roll
34	Sanitary napkins

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## ANNEX 5. STANDARD TREATMENT PROTOCOL FOR CHWS

Table A5. Steps in the treatment process by CHWs

### Step 1: CHW attends patients

Patient walks into CHW's house/community hall, or  
CHW visits patient's house in case of emergency or bedridden patients.

### Step 2: Identification

Phase 1 (when only mobile phones were used)

CHW requests the patient's health card number to verify insurance status. The ID number is recorded in the register.

If the patient is not carrying a card, or is a walk-in client, the CHW refers to her register, which has the unique numbers of the insured patients and all past visitors.

In the case of first-time patients, a new ID number is provided and registered.

Phase 2 (when HHDs and phones were used)

The patient identifies herself with her fingerprint.

The system prompts the patient's relationship to the programme (existing insurance client or walk-in client).

If the patient is insured, the system presents the financial balance available as part of the insurance. In case of an existing walk-in client, past medical history is displayed.

In case of first-time patient, a new ID number is generated through biometric registration.

### Step 3: Client categorization

Common for Phase 1 and 2

Client shares purpose of visit: either

    Consultation (which leads to Step 4), or

    Purchase of preventative goods (leads to Step 7).

### Step 4: Documentation of complaint

Phase 1

CHW documents, as reported by the patient:

    The medical complaint

    Any additional medical history of the patient

    Undertakes and documents visual diagnosis for physiological parameters (body weight and height, temperature, pulse rate).

Phase 2

CHW enters the data on the HHD, as reported by the patient:

    The medical complaint

    Any additional medical history of the patient

    Undertake and enter on HHD visual diagnosis for physiological parameters (body weight and height, temperature, pulse rate). Leads to Step 5.

If the patient is insured, the system gives the financial balance available as part of the insurance.

### Step 5: Diagnosis and consultation

#### Phase 1

CHW calls the doctor to share the complaint, history and physiological parameters. Doctor determines the diagnosis and shares prescription(s) (if any) with the CHW.

CHW takes paper-based notes in her register. This leads to Step 6

Based on symptoms and medical history, the doctor follows the STP available on the computer screen which s/he uses as part of doctor training and guidelines. The CHW doesn't have access to it on her mobile phone.

The doctor's prescription can be any of the following :

1. Advise to take rest or give any specific advice which relieves pain without medical intervention
2. Refer to another facility for immediate or follow-up treatment if it cannot be treated ideally by the CARE Arogya network
3. Provide a prescription

Based on the doctor's diagnosis and suggestion, the CHW records and communicates the doctor instructions to the patient. This leads to Step 6

#### Phase 2

Depending on the quality of connectivity, the data is transmitted live to the programme system's back end and appears on the doctor's screen.

Doctor at the back end uses the STP available on his screen and the CHW uses the CDSS on the HHD at the front end. If the system identifies the episode as one of the diseases the STP can diagnose, it prompts the CHW.

The CHW follows the CDSS available on the HHD. The CDSS could give two options:

- The CDSS could provide an automated prescription if the diagnosed symptoms match with the CDSS logic tree.
- In case the symptoms do not match then the HHD alerts and sends the data to backend doctor for consultation and advice.

The doctor reviews the information shared by the CHW determines the diagnosis and shares prescription(s) (if any) which is transmitted to the CHW's HHD, who presents a prescription (which may or may not have a medicine component) to the patient, which leads to Step 6), or

Based on symptoms and medical history, doctor can exercise the following options

1. Advise the patient to take rest or any specific activity (heat or cold press) which relieves pain without medical intervention
2. Refer to another facility for immediate care or follow-up treatment
3. Provide a prescription

### Step 6: Prescription generation

#### Phase 1

The CHW makes two records of the doctor-dictated diagnosis and consultation: one updates her master register; the other is shared with the client.

The CHW writes the diagnosis and provides a manual prescription slip along with the manual patient bill to the patient. This leads to Step 7.

## Phase 2

The CHW prints the diagnosis and prescription slip along with the patient bill (in case of a walk-in patient) through the HHD's in-built printer and shares it with the patient. This leads to Step 7.

CDSS prescription and patient history are synced automatically to the backend database on the server for real time access by doctors and the admin team.

### Step 7: Drug distribution

Depending on the complaint, the CHW undertakes the next step, common for both phases:

- According to the advice given in the prescription, the drugs are dispensed by the health worker, whether it's a CDSS or a prescription based on a consultation with a doctor. The CHW does not dispense drugs without a prescription.
- However, CHW provides over-the-counter products, which are part of her kit for common ailments, such as sanitary napkins, ointments, pain balms and cough syrup without consulting the doctor.

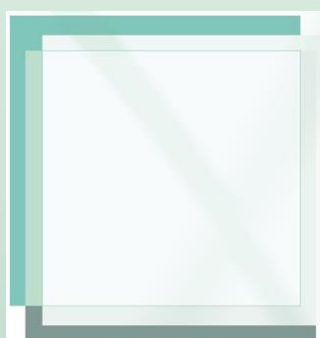
This leads to Step 8.

### Step 8: Follow-up

At the patient's home: To check with patient if s/he's feeling better and recovered from treatment. If the patient is not feeling better, guidance is given to her/ him for the next level of treatment through referral to PHC or to a tertiary care hospital.

ANNEX 6. REVENUE FORECAST MODEL

Assumptions										
Insurance penetration	10%									
Total population of villages	52,358									
Population of the Yavatmal town	116,714									
OP incidence (in town or village)	100%									
Market share of CHW	50%									
Percentage of patients referred to clinic by CHW	20%									
Market share of clinic in town	4.4%									
Doctors allowance in INR (@clinic)	20									
Doctors allowance in INR (@phone with CHW+A1)	5									
US\$ to INR conversion ratio	60									
Costs of incremental health staff (1 doctor + 1 nurse)	5,000									
Linear growth to maximum number of people or policies										
No increase in salary costs, admin, IT maintenance & clinic maintenance costs assumed given that the maximum per day patients is manageable with current resources										
Procurement costs to be driven by number of patients. Since last year figures were not representative of the trend we have used average of last three years in the estimation below.										
Vehicle allowance and conveyance expenses would be unchanged over the years										
Doctors' allowances are related to number of people visiting the clinic										
Per person revenue drivers seen in the last year will continue in the following years										
The programme would be able to reach the number of patients forecasted as maximum in 5 years										
Revenue from camps would not be affected by patients visiting clinic from town										
<b>Revenue &amp; costs driver</b>	Current	1	2	3	4	5				Patients per Day
Number of patients visting clinic (from town)	35	1,043	2,052	3,060	4,069	5,077		5,042	1,008.41	
Number of patients visting clinic (from villages)	575	1,507	2,439	3,371	4,304	5,236		4,661	932.16	16.73
Number of patients visting CHW	3,796	8,273	12,749	17,226	21,702	26,179		22,383	4,476.60	2
No of policies	303	504	705	907	1,108	1,309		1,006	201.19	
Implied patients per day at clinic (313 working days exclu	2	8	14	21	27	33				
Implied patients per day per VHC (365 working days exclu	0	1	1	1	1	2				
Implied time utilization of doctor (hours)	1	3	5	7	9	11				
Warning	-	-	-	-	-	-				
<b>Revenue forecast</b>										
	Revenue head	Actuals	Prev Year	1	2	3	4	5		
Clinic	Con and medicines	1,031	4,312.49	7,594	10,875	14,156	17,437			
	Camps	541	1,416.82	2,293	3,169	4,046	4,922			
	Diagnostics	669	2,797	4,925	7,053	9,181	11,309			
	Preventative products	602	1,579	2,556	3,532	4,509	5,486			
	Chronic care	121	318	515	711	908	1,105			
	<b>Total clinic</b>	<b>2,965</b>	<b>10,423</b>	<b>17,882</b>	<b>25,341</b>	<b>32,799</b>	<b>40,258</b>			
CHW	Con and medicines	2,012	4,384	6,757	9,129	11,502	13,875			
	Diagnosotics	252	549	847	1,144	1,441	1,738			
	Preventative products	1,675	3,650	5,625	7,601	9,576	11,551			
<b>Total VHC</b>	<b>3,939</b>	<b>8,584</b>	<b>13,229</b>	<b>17,874</b>	<b>22,519</b>	<b>27,164</b>				
Insurance	Insurance	1,515	2,521	3,527	4,533	5,539	6,545			
<b>Total revenue from the programme</b>		<b>8,419</b>	<b>21,528</b>	<b>34,638</b>	<b>47,748</b>	<b>60,858</b>	<b>73,968</b>			
<b>Cost forecast</b>										
	Cost heads	Actuals	Prev Year	1	2	3	4	5		
Clinic & CHW Management	Salaries (clinic)	20,426	20,426	20,426	20,426	20,426	20,426	20,426		
	Incremental salary of health staff	-	-	-	-	5,000	5,000			
	Salaries (VHC)	7,792	7,792	7,792	7,792	7,792	7,792			
	Clinic Maintenance	7,755	7,755	7,755	7,755	7,755	7,755			
	IT Maintenance	262	262	262	262	262	262			
	Admin Exp	4,599	4,599	4,599	4,599	4,599	4,599			
	Procurement (Clinic)	2,016	5,284	8,552	11,820	15,088	18,356			
	Procurement (VHC)	513	1,117	1,722	2,327	2,931	3,536			
	Vehicle Maintenance	971	971	971	971	971	971			
	Conveyance	1,335	1,335	1,335	1,335	1,335	1,335			
	Doctor allowances	666	1,192	1,876	2,559	3,243	3,927			
<b>Total Costs of the Program</b>		<b>46,334</b>	<b>50,732</b>	<b>55,288</b>	<b>59,845</b>	<b>69,401</b>	<b>73,958</b>			
<b>Net Profit or Loss</b>		<b>(37,915)</b>	<b>(29,204)</b>	<b>(20,650)</b>	<b>(12,097)</b>	<b>(8,543)</b>	<b>10</b>			



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