SETTING THE STAGE FOR SCALING UP A SUCCESSFUL EXPERIMENT: 
THE NKWANTA INITIATIVE IN RURAL GHANA

John Koku Awoonor-Williams, MD, MPH
Ellie S. Feinglass, MS
Frank Nyonator, MD, MPH
Tanya C. Jones, MPA
James F. Phillips, PhD

Paper presented at the 131st Annual Meeting of the American Public Health Association
San Francisco, California,
November 15-19, 2003

1 District Director of Medical Services, Nkwanta District, Volta Region, Ghana; kawoonor@africaonline.com.gh.
2 Staff Research Associate, Policy Research Division, Population Council, One Dag Hammarskjold Plaza, New York, NY 10017; efeinglass@popcouncil.org.
3 Director, Policy Planning Monitoring and Evaluation Division, Ghana Health Service, Accra; nyonator@africaonline.com.gh.
4 Staff Research Associate, Population Council and Policy Planning Monitoring and Evaluation Division, Ghana Health Service, Accra; tjones@popcouncil.org.
5 Senior Associate, Policy Research Division, Population Council, One Dag Hammarskjold Plaza, New York, New York 10017; jphillips@popcouncil.org.
SETTING THE STAGE FOR SCALING UP A SUCCESSFUL EXPERIMENT: THE NKWANTA INITIATIVE IN RURAL GHANA

John Koku Awoonor-Williams, MD, MPH
Ellie S. Feinglass, MS
Frank Nyonator, MD, MPH
Tanya C. Jones, MPA
James F. Phillips, PhD

Abstract: There are few examples in the developing world where health care reform and the introduction of innovation are guided by evidence gained from experimental trials of policy options. This paper presents the experience of Nkwanta District, located in the Volta Region of southeastern Ghana, which has successfully replicated experimental service delivery innovations developed by the Navrongo Health Research Centre (NHRC) in northern Ghana. Using locally available and highly constrained resources, the Nkwanta initiative has demonstrated the feasibility and impact of changing clinic-based primary health care to a system based on the Navrongo experimental model of community-based services. Successful replication demonstrated that the Navrongo success story is not a mere artefact of the special resources of a research initiative, but is relevant to rural impoverished districts elsewhere in Ghana.

INTRODUCTION

Successful experimental studies often fail to influence large-scale operations because the resources that are directed to monitoring and evaluation inadvertently produce nonreplicable service delivery capabilities. As a consequence, research-based innovations are rarely expanded beyond their original target areas, representing lost opportunities to apply research findings to marginalized groups on a large scale (Simmons and Shiffman 2003). Resolving policy debate nonetheless requires rigorous, controlled experimental trials that test health and demographic hypotheses. Unanswered policy questions therefore pose an inherent strategic dilemma: Studies that are designed to provide definitive evidence of programme impact tend to require unique institutional capabilities that compromise the relevance of results to policy. This paper presents results of a study that was designed to address the scaling-up dilemma.

Beginning in 1994, the Ministry of Health launched an experimental study in Kassena-Nankana District of northern Ghana. This study, conducted by the Navrongo Health Research Centre (NHRC), produced initial results by 1997 that fostered policy deliberations about its relevance to the national reproductive and child health program. Beginning in 2000, efforts to scale up Navrongo results were coordinated by a new national program known as the
Community-based Health Planning and Services (CHPS) initiative. Nkwanta represents the first district where CHPS was implemented. Based on the results of the Navrongo Experiment, the Nkwanta initiative tests the hypothesis that operations that are developed and tested in an experiment can be replicated and have an impact in a nonresearch setting which is characterized by limited resources for health services and therefore more representative of other rural areas of Ghana. Testing this hypothesis represents a trial of the “Hawthorne effect”, which is often cited as the primary rationale for rejecting the relevance of experimental results to large-scale programme operations. Addressing the Hawthorne hypothesis therefore requires unobtrusive and low-cost research on the replicability of experimental findings and the sustainability of the scaling-up process (Phillips et al. 1984, Phillips 1988 and 1990, Nyonator et al. 2003).

The legacy of community health services. Ghana has a long history of commitment to improving access to health care. In response to the 1978 Alma Ata Conference, “health for all” became national policy, and the goal of expanding access to affordable, high-quality health care was integrated into successive national health plans. Yet, despite a decade of commitment to this policy, over 70 percent of all Ghanaians lived in rural areas that were eight kilometres or more from a health care facility in 1990. Even today, roads and the transportation infrastructure remain largely inadequate, resulting in pronounced inequities in access to care. Primary health care remains remote to most rural households; infant mortality rates in rural areas are fifty percent higher than those in urban settings (Ministry of Health 1999). In response to these challenges, the Ghana Health Service (GHS) has pursued a policy of increasing geographic access to health care delivery as one of the strategic pillars of the country’s health sector reform process (Ghana Health Service 2002, Adjei et al. 2002, Akosa et al. 2003).

While there was policy consensus about the need for community health services throughout the post-Alma Ata era, the relative merits of alternative approaches to developing community-based health care have been the subject of continuing discussion and debate. One view has emphasized the importance of developing a professional cadre of trained paramedics who could provide a full range of basic services, since safe motherhood interventions, antibiotic therapy, comprehensive family planning, and other essential health services required technical expertise (Amonoo-Lartson 1981). A contrasting view questioned the feasibility of sustaining the cost of posting paramedics to village locations and emphasized instead the potential value of developing volunteer services. An influential international conference led to the “Bamako
Initiative” which was promoted throughout West Africa as a means of sustaining volunteer service programmes with community-managed revolving funds for the provision of basic drugs and services (Knippenberg et al. 1990). But, practical problems with implementing and managing volunteer programmes in the past marred MOH commitment to the Bamako approach (Agyepong and Marfo 1992, Agyepong 1999). Thus, as the year 2000 approached, the commitment to achieving “health for all” through community services remained a distant dream to most rural households.

The Navrongo Experiment. In 1993, the dimensions of the health-policy debate were translated into an MOH-sponsored process of evidence-based policy development. A study was launched by the Navrongo Health Research Centre (NHRC), located in the remote and impoverished Kassena Nankana District of the Upper East Region. To address questions about the efficacy of volunteer strategies, a dimension of the experiment aimed to marshal traditional leadership, social institutions, and communication systems for establishing community accountability, volunteerism, and investment in health services. To address questions about the potential impact of professional paramedic services, nurses—known as Community Health Officers (CHO)—were trained to work as community-resident health providers. The Navrongo experiment was comprised of four cells representing implementation of the two dimensions (mobilising volunteer and traditional social institutions versus mobilizing CHO and community health service resources) independently, jointly, or not at all (Binka et al. 1995).

Operational details of the Navrongo experiment were developed in a pilot phase that incorporated intense social research on community needs and reactions to the programme. The Navrongo pilot phase consisted of a three-community trial of services, conducted in conjunction with intensive social research with the goal of answering questions about the feasibility of scaling up various strategies (Nazzar et al. 1995). Illustrated in Figure 1 as “Phase I,” the pilot
answered questions about the appropriate operational strategies for implementing arms of the experiment.\textsuperscript{3}

Strategies were developed for establishing community support for clinic construction and nurse outreach activity. Conveniently located clinics, known as Community Health Compounds (CHC) were constructed in pilot villages using volunteer labour. Operating from CHC, nurses were trained and equipped to provide outreach service delivery at the doorstep in 90-day coverage rounds. The health service package was designed to be as broad as possible, including immunization services, treatment of childhood ailments and diseases such as malaria, acute respiratory infections, and diarrhoeal diseases, and referral services to static health facilities. House-to-house visitation provides comprehensive family planning services and follow up, health education regarding sanitation, nutrition, family planning, and basic ambulatory care. CHO supervise Traditional Birth Attendants (TBA) and assist in uncomplicated deliveries. Extensive training was directed to developing community diplomacy and communication skills.

The pilot phase also tested means of implementing the volunteer arm of the study by convening a community health committee that is constituted by the council of chiefs and elders. Volunteers were recruited and trained to provide health information and a limited range of health services, such as the management of diarrhoeal diseases, treatment of malaria, sale of condoms, and health referral advice. To support the programme, communities conduct regular open forums, known as \textit{durbars} for discussing health and family planning services. Volunteer services are designed to reach male social networks, building legitimacy, understanding, and support for family planning and reproductive health services.

The pilot set the stage for a factorial experiment designed to assess the impact of the proposed configuration of care, illustrated in Figure 1 as “Phase 2.” (Binka et al. 1995). By 1996, the Navrongo Community Health and Family Planning Project (CHFP) was fully functioning as a district-wide experimental study, and by 1997 preliminary results indicated that the core strategies of the CHFP were effective—particularly if relocating nurses was conducted in conjunction with community mobilisation. The combination of deploying nurses and mobilising volunteerism increased the volume of health care several-fold. This lead to a 15 percent reduction in fertility by 1999, equivalent to a decline of one birth in the total fertility rate (Debpuur et al. 2001). In addition, posting nurses to communities reduced the odds of childhood mortality by over fifty percent (Nyarko et al. 2001).
Success in Navrongo stimulated the implementation of various activities in Nkwanta district, (illustrated in Figure 1 as “Phase 3” in the research programme). Through dissemination activities, the 10 Ministry of Health Regional Directors were informed of Navrongo progress and invited to review implications of the project for operational change. The Director of Health Services for the Volta Region communicated results to several District Health Management Teams (DHMT) in his region, and exchanges about interest in results prompted the NHRC to invite the Nkwanta DHMT to visit Navrongo. The Nkwanta District Director of Health Services and the Volta Regional Health Research Coordinator visited the NHRC and reviewed operations of the CHFP project, noting the efficacy of the community-based approach and its relevance to Nkwanta. To build consensus for adopting the Navrongo model, arrangements were made for the entire DHMT to observe the project firsthand. This was a critical step, as Ghanaian social norms place a high value on communal values and collective decisionmaking. Individuals trained in new methods are often hampered in their efforts if they must act in isolation promoting their personal views. In the case of the Nkwanta DHMT, there was initial apprehension on the part of the nurses, as community posting was viewed as a personal sacrifice with considerable risk to family life, personal security, and social relations. In addition, supervisors in the health care system had traditionally been clinic and office workers who seldom faced the rigors of community-level work. The logistics required to launch community services seemed daunting, particularly in light of the fact that replication of the CHFP would incrementally add to their workload rather than simply replace or restructure existing functions.

These apprehensions and concerns were addressed by direct exchange between peer counterparts in Navrongo and Nkwanta. Practical field demonstration of service operations oriented the Nkwanta DHMT to the innovative elements of the Navrongo experiment and assured them of the feasibility of restructuring health service delivery in their district based on the Navrongo model. After a week of joint community service delivery, Nkwanta staff members began planning the implementation of a pilot in their home district based on their collective understanding of the Navrongo service system and the practical steps required to change operations. Achieving this understanding of the Navrongo model could not have been realized in a classroom environment. Peer exchanges stimulated community nurse commitment to becoming integral actors in the improvement of community health in the district.
Shortly after the Navrongo-Nkwanta exchange, growing MOH commitment to utilize the Navrongo experiment led the MOH to convene a national conference for disseminating results. Beginning in 1998, successive “National Health Forum” conferences were organized to review Navrongo progress. All 110 DHMT were invited to the 1998 Forum, along with Regional Health Administrators and Directors of MOH Divisions in Accra, comprising the country’s entire senior health policy and implementation staff. Deliberations provided for an open debate on the implications of the Navrongo experience for national policy. Discussion focused on the replicability of the experiment in the broader national context. Some participants argued that the unique institutional resources in Navrongo were fundamentally responsible for project success and that when replicated in more typical rural settings, the programme’s impact would diminish. Others asserted that the process of observing workers, measuring results, and interacting with communities had subtle and nonreplicable effects arising from the tendency of participants to view research activities as tantamount to supervisory oversight. It became apparent from the interchange that evidence of programme impact in Navrongo alone would not be sufficient in mobilizing the political will essential to scaling up.

Ghana is characterized by significant ethnic, religious, and economic diversity. Having answered the initial question of whether the CHFP model of community-based care would result in improvements in both volume of services and health outcomes, Navrongo was poorly positioned to provide definitive evidence of the approach’s application in other cultural and geographical contexts. Senior officials emphasized the need for a project that would serve as a logical link between Navrongo’s sophisticated research site and the more resource-deprived settings that are typical of rural, impoverished areas of Ghana.

Experiences in Navrongo and Nkwanta thus contribute to contrasting stages in the process of applying research to the development of service systems in resource-constrained settings. Nkwanta has shifted the research agenda from questions about the nature and impact of innovation to a new generation of questions focused on the transferability of innovation within the health sector. Establishing the credibility of the Navrongo results ultimately required testing its feasibility and impact in other settings where realistic resource constraints would apply, typical administrative systems would prevail, and complex and diverse social conditions would require creative solutions. In responding to these complex challenges, Nkwanta pioneered the
implementation of a national programme to replicate the Navrongo CHFP, positioning its DHMT to develop and test strategies for translating Navrongo innovation into national action.\textsuperscript{6}

**THE SETTING**

Nkwanta, which spans over 5,500 square kilometres, is the poorest and most remote district in the Volta region (Figure 2). Ranking among the most impoverished districts in Ghana, its economy is dominated by subsistence agriculture and fishing. The district lacks paved roads, electrical power, telephones, and FM radio reception. The population has no access to pipe-borne water and instead depends primarily on drinking water from boreholes and hand-dug wells. Development is constrained by low levels of educational attainment. Health services are rudimentary, and a single physician serves the district’s 187,000 residents. Statistics on health status in the district are indicative of the profound effects of isolation and poverty on well being. The high prevalence of measles, malaria, and other communicable diseases is compounded by the inaccessibility of health facilities. In the context of profound isolation and impoverishment, the district is characterized by a high rate of infant mortality attributed to preventable causes. Water-borne diseases, such as schistosomiasis and guinea worm, are endemic.

Though a small hospital was established in Nkwanta by 1997, health facilities were grossly inadequate. As of 1998, there were only four health delivery points in three sub-districts, and there was no district hospital; the remaining two sub-districts had neither private nor public health facilities. Health staff were typically deployed to clinics located far from most communities, and outreach services were sporadic and poorly managed. Both family planning
and childhood immunization coverage in Nkwanta were persistently low, and approximately 25% of all children under 5 years of age suffered from severe malnutrition.

Only 11 percent of all newborns received DPT3 immunization; BCG coverage was 21 percent; and measles coverage was just 21.6 percent (Nyonator 1996). Poor family planning coverage was also known to be a problem in the district—a conclusion that has been confirmed by routine service provision data, as well as 2000 survey data showing that the prevalence of modern contraceptive use was just above three percent. In the period prior to 1998, an average of eight maternal deaths were reported each month, signifying a maternal mortality rate that was well in excess of 1000 deaths per 100,000 live births. In light of these obstacles to health and development, when compared to the Navrongo context, Nkwanta represented perhaps an even more complex challenge for health systems development.

While populations in both Navrongo and Nkwanta are characterized by the absence of a modern economy and profound isolation from modern institutions and secular government, the districts differ markedly in terms of their culture and ecology. Whereas Navrongo has two ethno-linguistic groups, each residing in dispersed settlement areas of geographically contiguous zones, Nkwanta settlement patterns are clustered by hamlet, each with multiple ethno-linguistic groups. As many as five languages may be spoken in a single village, with each group led by its own chieftaincy and lineage system. This linguistic diversity presents unique challenges in terms of behaviour change communication and health education. Finally, while Navrongo has extensive resources for equipment and logistics support embedded in its research protocol, Nkwanta’s less sophisticated institutional capacity is more typical of district health systems in other rural districts of Ghana.

STEPS IN THE REPLICATION PROCESS
Confronting the challenges of low service coverage and poor health indicators required the DHMT to begin by reviewing the steps and components of Navrongo that could be feasibly transferred to the district. Strategic planning focused on clarifying key steps and components of the community health service development process, not only to guide action in Nkwanta, but also to provide a basis for the Nkwanta team to advise the national programme on practical requirements for scaling up the initiative throughout Ghana. Table 1 summarizes the process of
<table>
<thead>
<tr>
<th>Navrongo implementation milestone</th>
<th>Nkwanta replication constraints</th>
<th>Nkwanta adaptation</th>
<th>Implication for CHPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1) Preliminary community-based planning</strong></td>
<td>• Problem diagnosis&lt;br&gt;• Resource appraisal &amp; mobilisation&lt;br&gt;• Consensus building&lt;br&gt;• Pilot trial&lt;br&gt;• Pilot appraisal&lt;br&gt;• Capacity building for change&lt;br&gt;• Community mapping &amp; district zoning</td>
<td>• Limited staff resources &amp; inadequate funding&lt;br&gt;• Lack of staff consensus on the feasibility of community services&lt;br&gt;• Lack of staff for community liaison work, enumerating &amp; mapping</td>
<td>• Phased implementation&lt;br&gt;• Planning for “Day School”&lt;br&gt;• Counterpart training in Navrongo&lt;br&gt;• Nkwanta pilot zones’ counterpart training for remaining staff&lt;br&gt;• Train Disease Control Officers in community liaison &amp; CHPS coordination&lt;br&gt;• Phased implementation as national policy&lt;br&gt;• Need for national manpower plan for CHPS&lt;br&gt;• Utility of counterpart ‘hierarchical’ training for introducing operational change</td>
</tr>
<tr>
<td><strong>2) Community entry</strong></td>
<td>• Orient community leaders&lt;br&gt;• Select Community Health Committee&lt;br&gt;• Train Committee&lt;br&gt;• Conduct community orientation durbar&lt;br&gt;• Discuss &amp; plan CHC volunteer construction effort</td>
<td>• Multi-ethnic, multi-lingual communities</td>
<td>• Develop leadership role of secular political leaders&lt;br&gt;• Develop strategy for involving assemblymen</td>
</tr>
<tr>
<td><strong>3) Community Health Compound construction</strong></td>
<td>• Site selection&lt;br&gt;• Manpower planning&lt;br&gt;• Resource &amp; construction planning&lt;br&gt;• Construction</td>
<td>• Limited resources for supporting construction</td>
<td>• Renovate abandoned buildings as interim CHC&lt;br&gt;• Seek NGO leveraging of community investment&lt;br&gt;• Rapid diffusion of grassroots political support through community exchanges&lt;br&gt;• Develop guidelines on getting started with limited resources or facilities&lt;br&gt;• Train DHMT in fundraising&lt;br&gt;• Foster diffusion: Focus resources on developing ubiquitous pilot zones</td>
</tr>
<tr>
<td><strong>4) Essential equipment procurement</strong></td>
<td>• CHC equipment&lt;br&gt;• Motorbikes&lt;br&gt;• Bicycles</td>
<td>• Limited equipment or resources for procurement</td>
<td>• Use fixed CHC approach in communities where population density is high&lt;br&gt;• Allocate equipment to remote communities&lt;br&gt;• Develop guidelines on priority setting &amp; resource allocation</td>
</tr>
<tr>
<td><strong>5) CHO deployment</strong></td>
<td>• Selecting pilot CHO&lt;br&gt;• CHO training&lt;br&gt;• Community durbar&lt;br&gt;• CHO posting</td>
<td>• High staff turnover&lt;br&gt;• Low morale, loneliness&lt;br&gt;• Communication gaps &amp; referral problems</td>
<td>• Community-based CHO selection&lt;br&gt;• Motorola radio telephones&lt;br&gt;• Peer &amp; community support&lt;br&gt;• Decentralize recruitment &amp; training&lt;br&gt;• Expand Motorola access&lt;br&gt;• Develop supervisory training system on support services</td>
</tr>
<tr>
<td><strong>6) Volunteer training &amp; deployment</strong></td>
<td>• Selecting volunteers&lt;br&gt;• Volunteer training&lt;br&gt;• Community durbar&lt;br&gt;Volunteer launching</td>
<td>• Diversion of services from CHO&lt;br&gt;• Lack of motivation</td>
<td>• Develop volunteer health promoter roles; de-emphasize volunteer treatment roles&lt;br&gt;• Build community leadership for volunteer support&lt;br&gt;• Revise CHPS volunteer policy to restrict volunteer service activities</td>
</tr>
</tbody>
</table>

Table 1 Adaptation of the Navrongo model; implications for national CHPS policy
adapting the Navrongo service delivery model to the Nkwanta setting and ultimately to the point of integration into national policy.

In 1998, the Nkwanta DMHT adopted CHPS as a pragmatic approach to adapting community-based services according to local needs and circumstances, rather than simply as a means of replicating or recreating the Navrongo model. CHPS activities are phased in over time in the following six operational component milestones: planning, community entry, CHC construction, CHO training and deployment, essential equipment procurement, and volunteer mobilisation:

Preliminary planning: Preparing for the implementation process. The CHPS process was launched by grouping communities into service catchment areas termed “zones”, to which nurses would eventually be assigned. Attention was focused on developing the optimal configuration of work areas, given the ecology of the area, access to roads and trails, and access to health facilities. While only seven nurses were initially available for community posting, 16 zones were identified through the mapping and enumeration process. Rather than spreading resources so thin that no community would benefit from the programme, this approach ensured appropriate coverage in terms of the nurse to patient ratio within operating zones. Social and health profiles were developed for each zone, detailing ethnic composition, languages spoken, common traditional practices, and prevalent disease patterns. Profiles were used as the basis for assigning implementation priority to the most deprived areas, as evidenced by high levels of maternal mortality and communicable disease, as well as relative inaccessibility to clinical care. Community meetings, known as “durbars”, were convened to introduce the various components of the CHPS programme.

From its early stages, CHPS drew on community involvement and ownership to organize the construction or renovation of facilities that could act as service points for community-based health care. This generally involved convening councils of chiefs and elders and liaising with community leaders to mobilize community volunteer labor for clinic construction. These clinics, known as “Community Health Compounds” (CHC), became the residence of nurses, known as “Community Health Officers” (CHO), who were relocated from subdistrict clinics to CHC at the village level. As Ghana Health Service employees, CHO were assigned to communities less as members of the central health bureaucracy than as members of the community itself. At the time CHPS was launched in Nkwanta, many community leaders viewed the promise of a resident
nurse as an incentive for collective action. Through dialogue and negotiation, two communities agreed to provide free accommodation for the CHO, providing a basis for initiating pilot activities; abandoned buildings—acting as interim CHC—were renovated at the communities’ expense. The DHMT provided two motorbikes, as well as basic health care supplies and equipment. The pilot phase involved both gauging community and staff reactions to the programme and identifying areas for improvement.

Community entry. Nkwanta’s process of mobilizing community participation required overcoming a number of obstacles that were not encountered in Navrongo. As the result of the complexity of ethnic composition in the district, a zone might have as many as five languages, multiple chiefs, and heterogeneous patterns of community leadership and social structure. The Navrongo approach of deferring solely to traditional leaders as organizers of community action was consequently not appropriate in the Nkwanta setting. Instead, leaders were identified among elected officials, teachers, and clerics. Traditional leaders were involved in honorific, rather than organizing, roles. Taken together, the process of meetings, dialogue, and diplomacy involved in launching CHPS is termed “Community Entry.” Promoting community ownership of the CHPS programme begins with this process of consensus building and dialogue.

CHC construction. Constrained DHMT resources and extreme poverty in Nkwanta could have significantly slowed the pace of CHPS implementation in the district. However, provision of temporary facilities and mobilization of volunteer involvement in renovations at the community level facilitated the timely initiation of CHO services. As resources were raised for CHC construction, priority was given to communities that had launched CHPS in makeshift facilities. In this manner, resources for construction were used as an incentive to galvanize community commitment and action. Some communities pressed for district development funds; others approached local and national NGOs for external support.

The Nkwanta experience with resource mobilization attests to the value of social diffusion as a mechanism for catalysing operational innovation and change. Once action was demonstrated, social understanding of the service delivery system and demand for implementation spread. As the CHPS initiative has evolved, pressure to accelerate scaling-up efforts in the district has mounted, even in communities in which CHPS has not yet been launched. Rather than being promoted primarily by the DHMT, this demand originates at the
community level. Efforts to create demand from within communities is therefore a strategic priority of the national CHPS implementation programme.

**Essential equipment procurement.** In most rural areas of Ghana, where households are dispersed and there is no tradition of grouping closely contiguous compounds into hamlets, motorbikes are essential in ensuring that nurses can provide doorstep services. However, even in the absence of motorbike availability, interim CHPS operations can be launched in relatively clustered settlements provided that there is a sufficient density of CHC. As is the case in Navrongo, Nkwanta’s communities tend to be geographically dispersed. In the face of significant resource constraints, CHPS was strategically targeted to Nkwanta’s most remote and medically underserved areas. This represented an important deviation from the CHFP, in that CHPS zones were delineated in ways that excluded communities in close proximity to fixed health service facilities. Thus, as Table 1 (columns 3 and 4) indicates, team training in Nkwanta has emphasized practical strategies for adapting the Navrongo model to constrained resource planning.

**CHO deployment.** National planning for CHPS indicates that although there are approximately 5,300 zones in Ghana, only 2,000 trained nurses are available for deployment. While this gap in supply and demand is indicative of a fundamental need to evaluate and restructure nurse training programmes, immediate strategies are needed to minimize staff turnover and augment new recruitments. Improving communications systems is an integral step in this process. In particular, donor-supported “Motorola radio-telephones” continue to play a key role in raising both staff morale and service quality. Nurses can now seek advice on complex cases from both one another and from district hospital staff. Rather than travelling as many as 5 hours on her motorbike to consult the doctor, the CHO can instead rely on her Motorola to determine if a particular clinical presentation warrants referral. In addition, this enhancement in communication has been instrumental in mitigating the sense of isolation experienced by CHO—many of whom are separated from their spouses and children.

**Volunteer selection, training, and deployment.** When equipped with supplies and medication, volunteers often provide services that extend well beyond the limit of their training and clinical qualifications. Consequently, the “Bamako Initiative” approach to volunteer involvement that was promoted in Navrongo has been radically modified by the Nkwanta DHMT; while Nkwanta’s community health mobilization approach includes volunteers as key
players, their role is focused exclusively on providing essential support to CHO through health education, communications, and logistics management. This revised approach to volunteer involvement was explicitly introduced to minimize the likelihood that volunteers would substitute their interventions for those of more qualified paramedical staff, thus undermining positive health-seeking behaviour by community members.

The Nkwanta process of adapting Navrongo strategies to local needs produced an operational design that is different from the parent model, but guided by common principles of improving access, extending the range of health care options, enhancing service quality, and building social compatibility of the system of care. In 1999, Nkwanta’s experience with implementing the Navrongo model was reviewed at the National Health Forum. Demonstration that the pilot activities were successful prompted the MOH to develop a national programme for coordinating and sustaining the scaling-up process. In 2000, the Government of Ghana launched CHPS as a formal programme of utilization and scaling up—adopting CHPS as its core strategy for increasing access to primary care.

THE IMPACT OF CHPS

Because Nkwanta is not a research centre, designating experimental zones was not consistent with the DHMT mandate. However, resource constraints precluded CHPS implementation in all zones, and variance in the pace of implementation provided areal variance in exposure to CHPS that could be exploited for gauging the impact of the initiative. Utilizing implementation zones as treatment areas in a natural experiment is associated with an obvious limitation: Since exposed communities are not randomised, estimates of the impact of exposure are biased. However, selection of priority zones for the initiative was based on their relative remoteness and inaccessibility to essential services. Biases introduced by the assumption of experimental exposure therefore tend to under-estimate the impact of CHPS, as constraints on the programme are greater in exposed communities than in those that are unexposed.

The Rapid Survey Method. Where CHPS has been working, the volume of health services is expected to increase and health indicators are expected to improve. Under an initiative of the World Health Organization, district and regional technical teams throughout Ghana have been trained in “30-cluster survey” approaches to assessing family planning use, immunization coverage, and health-seeking behaviour. This procedure, which is known as the “Rapid Survey
Method” (RSM), has been promoted as a low-cost scientific means of evaluating the impact of family planning programmes, maternal health initiatives, expanded programmes in immunisation, and child healthcare initiatives (Frierichs and Tar Tar 1989, Lemeshow and Robinson 1985). Originally developed for applications in Asia, RSM has been used for descriptive epidemiological and sociodemographic assessments, with limited application to formal evaluation of the impact of service system change on health and family planning. A component activity of CHPS has been designed to adapt the RSM method to evaluating the effect of exposure to component activities on change in health status, contraceptive use, and health behaviour.

The underlying concept of extending the RSM concept to evaluating CHPS relates to the logic of “multi-level analysis”, or MLA. In this approach, statistical procedures are used to estimate the effect of community or other aggregate variables on dependent variables that are measured at the individual level. MLA is appropriate for evaluating the Nkwanta programme because CHPS activities are launched in “zones” that define worker catchment populations.

Data collection. In October 2002, Nkwanta district served as a demonstration ground for the development and testing of a monitoring and evaluation instrument for advanced CHPS districts. The multi-level CHPS impact assessment tool included a cluster questionnaire, a household questionnaire, and an individual questionnaire. The cluster-level questionnaire was fielded to determine the timing and content of exposure to CHPS activities for households located in the cluster. Where CHPS work has begun and service delivery zones have been designated, the date of onset of exposure to each step in the process defines the duration of exposure to CHPS activity on indicators of health status, so that statistical procedures estimate the net effect of each CHPS component activity on health, controlling for the background characteristics of the population.

The survey aimed to evaluate covariance of exposure to CHPS and change in health-seeking behavior, knowledge, and health outcomes. For the purposes of the district-level evaluation, 60 clusters were randomly selected by probability proportionate to size, with enumeration areas (E.A.s) acting as the unit of analysis or ‘cluster.’ Prior to cluster selection, the list of E.A.s was stratified by subdistrict to ensure geographical distribution of enumeration areas and to minimize standard error. Interviews were administered to 900 heads of household, 1,064
women between the ages of 15-49, and 180 community leaders, health officials, and school personnel.

Results. Table 2 presents indicators of health service coverage by areal exposure to CHPS activities. Survey data were analyzed using the following four groups of communities:

1) “Not yet CHPS:” Areas far (≥8 km) from a fixed health facility but not currently part of the CHPS programme. This group serves as a “control” group for the CHPS groups because it consists of similarly remote, medically underserved communities.

2) “Limited CHPS:” Areas that received CHPS services for 1-1.5 years but discontinued services due to lack of adequate community mobilization.

3) “CHPS:” Areas far (≥8 km) from a fixed health facility and currently receiving CHPS services.

4) Near clinical service point: Areas near (<8 km) a clinic/health centre/hospital and not receiving CHPS services.

Table 2 Selected health indicators from Nkwanta District by extent of exposure to the CHPS Initiative, October 2002

<table>
<thead>
<tr>
<th>Health indicator</th>
<th>Not yet CHPS comparison area</th>
<th>Limited CHPS</th>
<th>CHPS</th>
<th>Near services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent knows of at least one method of family planning</td>
<td>23.8 percent</td>
<td>31.5 percent</td>
<td>48.1 percent</td>
<td>38.1 percent</td>
</tr>
<tr>
<td>Respondent currently using a method of family planning a</td>
<td>4.3 percent</td>
<td>8.0 percent</td>
<td>14.6 percent</td>
<td>8.8 percent</td>
</tr>
<tr>
<td>Respondent received antenatal care during last pregnancy</td>
<td>72.7 percent</td>
<td>72.6 percent</td>
<td>94.4 percent</td>
<td>88.0 percent</td>
</tr>
<tr>
<td>Respondent vaccinated with tetanus toxoid during last pregnancy</td>
<td>67.7 percent</td>
<td>63.2 percent</td>
<td>87.8 percent</td>
<td>81.2 percent</td>
</tr>
<tr>
<td>Respondent’s last delivery attended by trained clinician b</td>
<td>9.8 percent</td>
<td>14.6 percent</td>
<td>24.5 percent</td>
<td>21.0 percent</td>
</tr>
<tr>
<td>Respondent received postnatal care after most recent birth</td>
<td>25.8 percent</td>
<td>39.6 percent</td>
<td>62.2 percent</td>
<td>47.6 percent</td>
</tr>
<tr>
<td>Respondent states that exclusive breastfeeding is the healthiest food for an infant 0-6 months</td>
<td>51.3 percent</td>
<td>54.8 percent</td>
<td>58.2 percent</td>
<td>54.4 percent</td>
</tr>
</tbody>
</table>

Notes: * Statistically significant at p≤0.01; ** Statistically significant at p≤0.05; a Because of the small total number of family planning users, regression analysis was not performed on this outcome; b For the purposes of this analysis, response choices were collapsed into 2 categories—only those births assisted by a doctor, CHO, or midwife were considered to be attended by a trained clinician.

Prior to CHPS implementation, family planning usage in Nkwanta District was estimated to be less than 4 percent (DHS 1998). Results from the 2002 survey indicate that prevalence of
family planning usage in the district had climbed to 8.6 percent. Differentials by CHPS exposure illustrate that within CHPS zones, family planning usage was 14 percent. While this is still low, the prevalence of family planning in CHPS areas was three times higher than in Not yet CHPS areas. Similarly, the odds of knowing of at least one method of family planning were 2.2 times greater (p<0.01) among CHPS women than Not yet CHPS women, controlling for education level, religion, marital status, ethnicity, age, and an asset index. Of the respondents who reported knowing any method of family planning, oral contraceptives and injections were the most commonly cited. Only 40 percent of all female respondents mentioned condoms.

Findings from the 2002 Nkwanta Survey also indicate that the odds of having received antenatal care were more than five times greater among CHPS women as compared to those residing in similarly remote, medically underserved communities. Similarly, the odds of having received postnatal care were four times greater among women receiving CHPS services as compared to Not yet CHPS women, controlling for relevant factors such as religion, wealth, age, ethnicity, marital status, and an asset index (p<.01 for both indicators). The odds of receiving antenatal and postnatal care were also 2-3 times greater among women exposed to CHPS compared to women living near medical services (p<.05). The practical implications of these differences are perhaps more significant than the numbers suggest. Because women living in CHPS zones have limited access to emergency obstetric care, screening for high-risk cases in these communities is arguably more critical than for women who have better access to medical services. Thus, the greater proportion of women in CHPS areas obtaining antenatal and postnatal care compared with those living in proximity to health facilities likely understates the true impact of this initiative on neonatal and maternal outcomes.

Analyses of childhood immunization data are summarized in Table 3. Results demonstrate that the odds of being fully immunized were 2.4 times greater among children living in CHPS areas as compared to children in Not yet CHPS areas (p≤.05). In terms of specific vaccinations, the odds of completing the polio series were 2.8 times greater among children who have a CHO residing within their community as compared to those living in comparison areas (p<.05). The odds of completing the DPT/Penta series were 3.6 times greater among CHPS respondents (p<.01). Although full immunization was associated with CHPS exposure, coverage of BCG and measles vaccination was not associated with CHPS exposure. While odds ratios for these outcomes were not statistically significant, it should be noted that the percentages of
children vaccinated against both BCG and measles were greater among those children living in CHPS areas as compared to those in Not yet CHPS areas. One potential explanation for these findings is that small cell counts did not provide adequate power in regression analyses. However, a more in-depth analysis of this data is required to identify priority areas for increasing immunization coverage within the CHPS framework.

**Table 3** Child immunization rates by extent of exposure to the CHPS Initiative, October 2002

<table>
<thead>
<tr>
<th>Immunization status</th>
<th>Not yet CHPS comparison area</th>
<th>Limited CHPS</th>
<th>CHPS</th>
<th>Near services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>percent</td>
<td>percent</td>
<td>odds ratio</td>
<td>percent</td>
</tr>
<tr>
<td>Child fully immunized (children 12-24 months at time of survey)</td>
<td>36.8</td>
<td>29.2</td>
<td>0.9</td>
<td>68.9</td>
</tr>
<tr>
<td>Child vaccinated against measles (children 12-24 months of age at time of survey)</td>
<td>53.8</td>
<td>35.4</td>
<td>0.6</td>
<td>73.3</td>
</tr>
<tr>
<td>Child who received complete polio series (children 12-24 months of age at time of survey)</td>
<td>41.5</td>
<td>37.5</td>
<td>1.2</td>
<td>76.7</td>
</tr>
<tr>
<td>Child who received complete DPT/Penta series (children 12-24 months of age at time of survey)</td>
<td>36.8</td>
<td>39.6</td>
<td>1.8</td>
<td>76.7</td>
</tr>
<tr>
<td>Child vaccinated against BCG (children 12-24 months of age at time of survey)</td>
<td>68.9</td>
<td>62.5</td>
<td>1.2</td>
<td>80.0</td>
</tr>
<tr>
<td>Children whose mothers presented immunization records at time of interview</td>
<td>41.6</td>
<td>44.6</td>
<td>0.5</td>
<td>66.8</td>
</tr>
</tbody>
</table>

**Notes:** * p ≤ 0.01; ** p ≤ 0.05; a To be considered “fully vaccinated”, a child must receive BCG, measles, the complete polio series, and the complete DPT/Penta series by the age of 12 months (WHO 1985); b Analysis of child health record keeping includes all children surveyed between the ages of 0 and 5 years.

Aside from a positive impact on full vaccination, the presence of a CHO in Nkwanta’s most marginalized communities was associated with enhanced child health record keeping. The percentage of children whose mothers were able to produce their health cards at the time of the interview was comparable in CHPS areas and Near Services areas, and both were significantly greater than the percentages of children with immunization records in Limited CHPS and Not yet CHPS areas. Regression analysis showed that the odds of the mother having a health card for her child were 3 times greater for children in CHPS areas as compared to those living in Not yet CHPS areas, controlling for age of mother, child’s age, mother’s education, birth order, sex, and an asset index (p<.01).
Findings suggest that some health interventions are more amenable to continuous household outreach services than others. Childhood immunization is an example of a programme that lends itself to campaigns, provided that campaigns are conducted frequently enough to reach children at the appropriate ages for the various vaccines. In Nkwanta, nurse outreach teams travel in cycles to communities as part of the Expanded Programme for Immunization (EPI). While EPI campaigns are typically implemented via fixed posts or mobile clinics at the community level, routine immunization in CHPS areas is conducted during the course of home visits. However, although all households are ultimately covered, visitation rounds often exceed three months—too long an interval for optimally timed EPI coverage. Aside from the timing of visitation cycles, EPI, which entails complicated cold chain logistics, may be more effectively managed through the campaign approach.

Despite the various problems that have been highlighted, the successful Nkwanta district adaptation of the Navrongo service model and evidence that the Nkwanta initiative has replicated important elements of Navrongo impact represents an important intermediate step in the advancement of CHPS as national policy.

THE IMPACT OF NAVRONGO AND NKWANTA TRAINING ON CHPS

Nkwanta has strengthened national commitment to implementing the CHPS programme by demonstrating the feasibility of adapting the Navrongo CHFP service system to the needs and circumstances of another district. But impact has also been derived from direct transfer of the Nkwanta experience to visiting health management teams from other districts. A process of exchange has been launched that enables DHMT and frontline health workers to observe a functioning programme and receive guidance from Nkwanta counterparts. The district has increasingly served as a demonstration area for the CHPS programme, whereby DHMT who seek experience with the programme have traveled to the district for counterpart exchanges. According to this approach, implementation teams comprised of the District Director of Health Services, the District Public Health Nurse, the District CHPS Coordinator, at least one Sub-District supervisor, and at least two CHO visit Nkwanta for peer orientation to the service model. This involves two weeks of field observation of the health system, extensive exchanges on the job with counterparts, and training on the essential components of CHPS implementation. The goal of these exchanges is to enable visiting teams to plan a CHPS pilot and rapidly implement
the programme in one or two implementation zones. Then, based on lessons learned by actually running operations, the implementers scale up operations within their district, according to the availability of resources, staff capacity, and local needs. A similar orientation programme has been in operation in Navrongo. Taken together, the Navrongo and Nkwanta training programmes constitute a mechanism for fostering change from clinic-based operations to community-based primary health care.

In 2001, Nkwanta trained eight visiting DHMT and their pilot implementation teams. In 2002, an additional seven teams were trained, and seven more were trained in 2003. This systems demonstration for visiting districts provides efficient and practical on-site training and guidance to DHMT and implementation teams on CHPS operations, including community mobilisation for reproductive health, family planning, and primary health care; zoning and mapping of communities; technical guidance and assistance on the conduct of the EPI and safe motherhood coverage surveys; and establishment of community health compounds, community health committees, and village volunteer health aides. In this role, Nkwanta district serves as an organisational development capacity-building site and acts as a resource for fostering the rapid diffusion of expansion of CHPS to other districts.

The impact of this training program has been assessed by examining the effect of exposure to Nkwanta and Navrongo training on the onset of CHPS milestones and the geographic coverage of CHPS-initiated services. Using a statistical model that adjusts for the pace of CHPS implementation prior to exposure and in the absence of exposure, the effect of Nkwanta training can be examined using the CHPS monitoring and evaluation database as a series of dependent milestone variables. Results show that exposure to Nkwanta training has accelerated both the onset and coverage of community entry, CHC construction, and CHO posting. In general, the impact of Nkwanta training has been greater than that in Navrongo, although both sources of training have had effects on the onset and coverage of CHPS. These findings suggest that Nkwanta CHPS activities have had an impact, not only on health indicators in the district, but on community-based services elsewhere in Ghana.

CONCLUSION
Based on the Navrongo CHFP model, Nkwanta District has changed its service delivery strategies from clinic focused to community-based services using a pilot and qualitative research
to guide the process. By adapting the model to the local context, Nkwanta was successful in achieving significant impact on a number of health indicators. Since approaches used differ somewhat from the Navrongo experiment, Nkwanta has validated the notion that the Navrongo approach should be viewed less as a boilerplate for replication than as a process for adaptive development of appropriate health care. Nonetheless, Nkwanta represents a test of the replicability of the Navrongo experiment under the realistic conditions and circumstances of a district that lacks a sophisticated research infrastructure. Replication in Nkwanta has achieved two aims: demonstrating that replication can work, and demonstrating feasible means of scaling up replication in other districts.

Several elements of the Nkwanta initiative have not only replicated Navrongo effects, but appear to have exceeded levels of impact achieved by the Navrongo experiment. Activities that are best addressed by continuous community and household outreach, such as family planning services, have had a greater initial impact in Nkwanta than in Navrongo. This may be attributed to the fact that Nkwanta, like most districts in Ghana, has a unified management system, whereas Navrongo has administrative operations for research that are separate from the DHMT, weakening to some extent the integrity of supervisory support for household service operations. Nonetheless, other key elements of the Nkwanta health service delivery system have not achieved the same degree of success. This is particularly true of service components that benefit from sophisticated technical and computing operations like those found in Navrongo, but are not easily replicated with the support of routine service statistics. In particular, precise tracking of pregnancy and births in Navrongo provides crucial information to CHFP community workers that non-computerized procedures in Nkwanta have yet to fully achieve. An effective household service delivery strategy for childhood immunization requires the availability of information regarding which compounds must be visited at critical months of infancy. In theory, active outreach should result in higher immunization coverage than passive fixed posts or mobile clinic approaches; in practice, however, the success with which active outreach achieves higher rates of vaccination coverage has not been demonstrated for all antigens, suggesting that impact is contingent on improved management information systems that support the prioritisation and timing of service activities.

The national impact of the Nkwanta initiative demonstrates the importance of developing strategies for bridging the gap between research-based innovation and broader policy and health
sector reform. In the absence of the advanced demographic and social research capabilities of the NHRC, Nkwanta provides a credible and well-researched adaptation of the Navrongo experiment. The success of Nkwanta challenges sceptics who question the relevance of the Navrongo experiment to the needs of resource-constrained districts elsewhere in Ghana. With Nkwanta taking the lead, CHPS has become a mechanism for solving the national health service accessibility problem.
Acknowledgments

This paper was made possible through support provided by the Office of Population, Bureau for Global Programmes, Field Support & Research, U.S. Agency for International Development, under the terms of Award No. HRN-A-00-99-00010. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development.

References


Notes

1 The term “Hawthorne Effect” is a reference to a study by Roethlisberger and Dickson (1939) that showed that improved factory worker performance in an incentive study was related to the fact that workers were observed rather than to the incentive itself. The term “Hawthorne Effect” refers to the more general hypothesis that field experiments generate management, organizational, psychological, and resource circumstances that differ from the institutional context of large-scale systems that results are intended to influence.

2 Navrongo focus group sessions indicated that clinical staff were often perceived as arrogant and insensitive. Community respondents were therefore skeptical of schemes that would involve posting clinical staff to their communities. In response to this climate of opinion, nurses known as “Community Health Nurses” were retrained in community liaison, diplomacy, and service quality. Upon completion of their training, community gatherings were convened, known as “durbars”, to inform communities of the new identity of these workers, who were given the new title “Community Health Officers” to signify their new status as true community health service providers. This quality assurance procedure was also followed in Nkwanta and has become national policy.

3 Various terms have been applied to processes of strategic planning that involve micro-implementation conducted in conjunction with social research. “Open systems research” derives from the notion that human service organizational designs are most effective if operational activities and formal organizational structure resembles the social institutional structure of the population served (Katz and Kahn 1966). Open systems research aims to determine how those structures are optimally configured. Various applications of this perspective have employed different terms, such as “the Community Learning Approach” (Korten 1980a, 1980b), the “Participatory Learning Approach” (Nazzar et al. 1995, Solo et al. 1998), and “Strategic Planning” (Paul 1982). The Ghana research phases represent an adaptation of the WHO “Strategic Approach” to the local context. A precursor of the Strategic Approach was used in Bangladesh to assess community and worker reactions to a national programme in scaling up the Matab experiment (Simmons et al. 1984). Since that time, the approach has been refined and developed as a mechanism for guiding the introduction of contraceptive technology in Latin America, Africa, and East Asia (for example, Simmons et al. 1997). More recently, the paradigm has been further extended to large-scale programmes in quality assurance and systems change and development (Simmons et al. 2002.) The CHPS initiative has utilized the Strategic Approach for guiding the utilization of the Navrongo model for the national health care reform process (Akosa et. al. 2003, Nyonator et al. 2002a, 2002b, 2003).


5 A recent review of the literature on the science of scaling up experimental initiatives has noted the crucial contribution of mechanisms for linking research-based innovation to the large-scale system (Simmons and Shiffman, 2003). Launched initially as an informal programme of research dissemination, CHPS was established to develop this linkage process. Nkwanta was an initial component of the CHPS programme designed to bridge the gap between Navrongo research and large-scale policy deliberations.

6 For at least five decades, social research has demonstrated ways in which ideational change is the function of social interaction shaped by social networks, opinion leadership, and other determinants (see Rogers 1995). More recently, organizational scientists have noted ways in which the principles of diffusion can foster innovation in formal organizations, if action is taken to create the conditions of interaction, networking, credibility, and catalytic policy input. “Change agents” are deemed to be crucial to this process, a role that Nkwanta and Navrongo continue to play in the CHPS programme (see Mintrom 1997).

7 The method of “Principal Components Analysis” (PCA) was used to identify a common analytic scale corresponding to the common variance explained by 10 indicators of wealth and economic status. PCA uses the method of maximum likelihood to extract a common factor from correlated indicators. The “principal component” is a normalized index with a mean of zero and standard deviation of one.