Final Project Research Report
January 2018

Smart Procurement, Supply Chain and Distribution of Medicines at Government Health Facilities

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About the Organizations

1. The Shahid Javed Burki Institute of Public Policy at NetSol

The Shahid Javed Burki Institute of Public Policy at NetSol (BIPP) is an independent, not for profit institution which aims at: promoting rights and evidence based inclusive policy making; filling institutional void and professionalizing the key public policy areas; and serving as a knowledge hub for policy analysis, development, and implementation. BIPP was formally launched on 1st March 2015 as a successor to the Beaconhouse National University Institute of Public Policy with a rich legacy of over eight years of research and policy analysis.

The Institute focuses on synergizing the research, education, and think tank functions to become a Centre of Excellence in Public Policy. BIPP's mission is to improve welfare of the citizenry with particular emphasis on identifying policy measures that will lead to inclusive growth, socio-economic stability, and sustainable development besides fully harnessing the potential for regional and global integration. BIPP's areas of interest are social, economic, environmental and political development, trade and foreign policy.

The Institute Board of Directors comprises eminent economists, experts, members of academia and development practitioners from private, public, and non-governmental sectors who are committed to improving public policy development and implementation in Pakistan. The composition of the board is:

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2. Sub-National Governance Programme

The Sub-National Governance (SNG) Programme achieves its objectives through supporting reforms in planning, budgeting, and monitoring to establish the systems and processes that will enable the governments to respond more efficiently and accountably to the public service needs of local communities.

We do this by providing the governments with support in four main areas:

- Assessing citizen's needs through surveys, public consultations and other approaches
- Aligning budgets with citizens' needs through output-based budgeting and other techniques
- Piloting novel solutions to public service delivery, using 5.4 million £X District Development Challenge Fund (DDCF)
- Monitoring and evaluating progress using a range of techniques and technologies, including geographic information systems (GIS)
- Strengthening decentralized governance

The program works through evidence-based identification of needs of the people using innovative techniques such as GIS as well as leveraging on citizen feedback platforms to gauge the quality of public services. SNG also supports new and innovative ideas for improving service delivery, through District Delivery Challenge Fund, on a pilot basis, making sure that resources are allocated on the basis of evidence of needs and solutions that work.

Since its inception in April 2013, the SNG is geared towards creating an enabling environment for local problem solving by bringing together local governments, service beneficiaries, and partner programs to work in an enterprising and collaborative manner to improve service delivery outcomes.

About the Authors

1. Shahid Javed Burki

Mr. Burki is a prominent Pakistani economist who has been a member of the faculty at Harvard University, USA and Chief Economist, Planning and Development Department, Government of the Punjab. He has also served as Finance Minister of Pakistan, and has been the author of a number of world renowned books, journal and newspaper articles. He has had a long and distinguished career at the World Bank. Mr. Burki joined the World Bank in 1974 as a Senior Economist and went on to serve several senior positions. He was the (first) Director of the China Department (1987-1994), making him responsible for managing the World Bank's dialogue with the Chinese authorities. He served as the Regional Vice President for Latin America and the Caribbean during 1994-1999. He retired from the Bank in 1999.—Please remove jobs that have expired. Or let them be posted them just write a text in red that says Expired so visitors can see a few historic jobs posted.

2. Shahid Najam

Mr. Najam is the Vice Chairman of BIPP. He has four Masters including LLM and MSc. Public Policy form London School of Economics, UK and MSc. Rural Development from Wye College London. He has more than 39 years of experience (17 years with Government of Pakistan and more than 22 years with the UN System) in policy and strategy formulation; development planning and programming; and implementation of large scale programmes for sustainable development. He joined the Pakistan Administrative Services in 1974 and held important assignments including Commissioner Lahore Division (1999-2001). As the first Chief Operating Officer, he made key contribution in establishing the Punjab Board of Investment and Trade in August 2009. Mr. Najam worked with the UN system on senior positions including Chief of Management Support Services covering 133 Decentralized Offices (2002-2007), FAO Representative, Iran (2007-2009) and Resident Coordinator/Resident Representative of the UN system in Turkey (2009-2013). He led the formulation and implementation of UN Development Cooperation Strategy for Turkey (2011-2014), a pioneer initiative in the world to reposition UN system in the Middle Income Countries. He was also

instrumental in establishing the UNDP Istanbul International Centre for Private Sector in Development.

3. Asad Ejaz Butt

Mr. Ejaz is an economist trained in Canada. He holds a Master's degree in Economics and International Development studies from the University of Guelph (2015) where he got the opportunity to teach undergraduate courses in Macroeconomic theory as a teaching assistant and worked as a research fellow on multiple labor and economic development assignments. Prior to that, Mr. Ejaz was awarded a Cum Laude undergraduate degree in Economics from York University (2013) where he was listed on the Dean's Honor Roll in lieu of his proven academic success. He also holds an undergraduate degree in Business Administration from the Institute of Business Administration (IBA), University of the Punjab. Mr. Ejaz has embarked on several research and consultancy assignments since 2013, recently working as a Consultant with ICF International, a global energy policy and advocacy consulting firm, where he modeled energy efficiency products for ICF's demand-side management projects. In the process, he has advised and provided energy consultancy services to a number of multilateral and bilateral donors and funding agencies including the UN, USAID and state-owned utilities in the US. Apart from his consulting endeavors, Mr. Ejaz is currently teaching as a visiting faculty in several state and privately owned universities in Lahore including University of Central Punjab and Bahria University where he is taking undergraduate courses in Development, Macro, Mathematical and Managerial Economics. At BIPP, Mr. Ejaz is involved in coordinating and synergizing the research, consultancy, think tank and knowledge management functions of the Institute with a view to maximizing its potential in producing credible, empirical and evidence based knowledge and policy products on political, economic, social, environmental and security related issues of national and global significance.

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0. Introduction

This research report, based on the information and data generated, experience gained and lessons learnt during the course of the implementation of DFID/SNG assisted: 'TEEMARDAR: Smart Procurement, Supply Chain and Distribution of Medicines at Government Health Facilities' project, seeks to bring out: (a) the progress and achievements made by the "Teemardar" project in the selected health outfits of Sheikhupura district; and (b) identify the areas of improvement in the policy, institutional and operational domains to ensure efficient and responsive management of health apparatus and pro-poor delivery of health services.

1. Project Overview

The Teemardar Project was approved for funding by the Department for International Development (DFID) under its Sub-national Governance Programme with a budget of Rs 35.54 million and time frame of 18 months commencing June 2015. It was to be implemented in seven locations i.e., DHQ Sheikhupura, THQ Hospitals Muridke and Sharaqpur, RHCs Kharianwala and Farooqabad and BHUs Ghang and Farooqabad village. The project envisioned improved and better governance and delivery of health services through development and implementation of a robust Information and Communication Technology (ICT) solution which will ultimately lead to the improved health indicators for the general public. More specifically, the project intended to achieve the following objectives:

1.1. Objectives

- Improve economic, social and specifically the health indices and outcomes for the poor people residing in the project area;
- Better delivery of health services through implementation of ICT integrated solutions with focus on the local poor through assured availability and accessibility of free medicines and services;
- Reduce pilferage, embezzlement, corruption, inefficient management and misuse of free medicine and service by computerized inventory and stocks management, tracking the patients and their health record management.
- Develop a 'Disease Early Warning System' for control of spread of epidemics.

1.2. Project Implementation Partners

A consortium of the Shahid Javed Burki Institute of Public Policy at NetSol (BIPP), Pakistan Administrative Service Alumni Research Center (PASARC), E2E System Solutions and Sheikhu Jahangir Citizen Community Board of Sheikhupura (subsequently substituted by the local councilors and community leaders since JCMB became inactive) in close liaison with the District Coordination Office and the District Health Department (EDO, DO &DDOs Health, and Sheikhupura) was responsible for the project implementation. Citizens' participation and involvement was ensured through communication, awareness and sensitization programs e.g., public gatherings, corner meetings, print and electronic, media, civil society, and local politicians.

1.3. Project Components

The project comprised four components in order to achieve effective implementation of the project objectives and to identify specific policy, institutional and operational measures that may be required to ensure better management and delivery of health services. Each component was further divided into specific quarterly milestones to ensure monitoring and smooth operation of the project activities.

1.4. Development and Deployment of TEEMARDAR Solution

With the assistance of E2E (partner IT company 30 man years of experience) and based on the business needs articulated by the District Government and Provincial Health Department (better inventory management, improved services delivery and effective management of health apparatus at the district level), ICT integrated solution "TEEMARDAR" was developed on the frame of a successful POS Candela. Candela is a complete barcode enabled solution for health supply chain management which facilitates effective management of inventory, suppliers, distribution, operations, and end consumers. An additional functionality of Teemardar system allowed population of the data of patients' demographics, doctor’s performance, incidence of diseases and prescription. A centralized dashboard as a part of Teemardar system was also developed that captures the compiled data and depicts, on a real time basis, the up-to-date

information on inventory and distribution of medicines which being accessible to the provincial/district health departments and the decision maker(s) serves them to make informed decisions on health planning and procurement and enforce implementation.

The Teemardar solution has, inter alia, the following capabilities:

a. Centralized management for transparent planning, monitoring and reporting purposes
b. Inventory management and Re-order levels
c. Invoice Generation and Point of Sales
d. Supplier Management and pilferage control at hospital dispensaries and warehouses
e. Physical Audits and Stock Takes
f. Patient demographics recording and reporting mechanism
g. Information recording and reporting of doctors, disease and prescriptions

The deployed main server is hosted with Microsoft Azure cloud hosting service and with an up time of 99.99%. In order to ensure business continuity and security of data and system, Teemardar has been configured on a three tier data back-up policy: on the main azure hosting service automatically; E2E back-up of the data; and End 2 End solution providers' weekly back up of data on a separate hard drive.

The integrated Teemardar solution is being run smoothly at all locations and with its enhanced capability and usefulness as a working tool, there is a wide demand by the medical officers, health staff (pharmacy and warehouse) and health managers for its replication elsewhere in the district. Indeed, the Medical Superintendent DHQ Sheikhupura has reportedly expanded the project activities on her own because of the associated benefits and the functionalities which the system provides for better inventory and health management.

1.5. Training and Capacity Building of Government Staff

Multiple training workshops were held during the course of implementation of the project. The training sessions aimed at building the capacity of the TEEMARDAR computer operators; the line staff of hospitals and the health administrators including senior staff on the use of Teemardar and Dashboard

effectively. The training sessions helped participants understand the process of installation, operations and troubleshooting of Teemardar; equip them with the basic hardware handling and enable them to do the process of storing, distribution, inventory closing and procurement planning of medicines. During the course of training workshops, the suggestions and inputs from the participants also helped refine and improve the system.

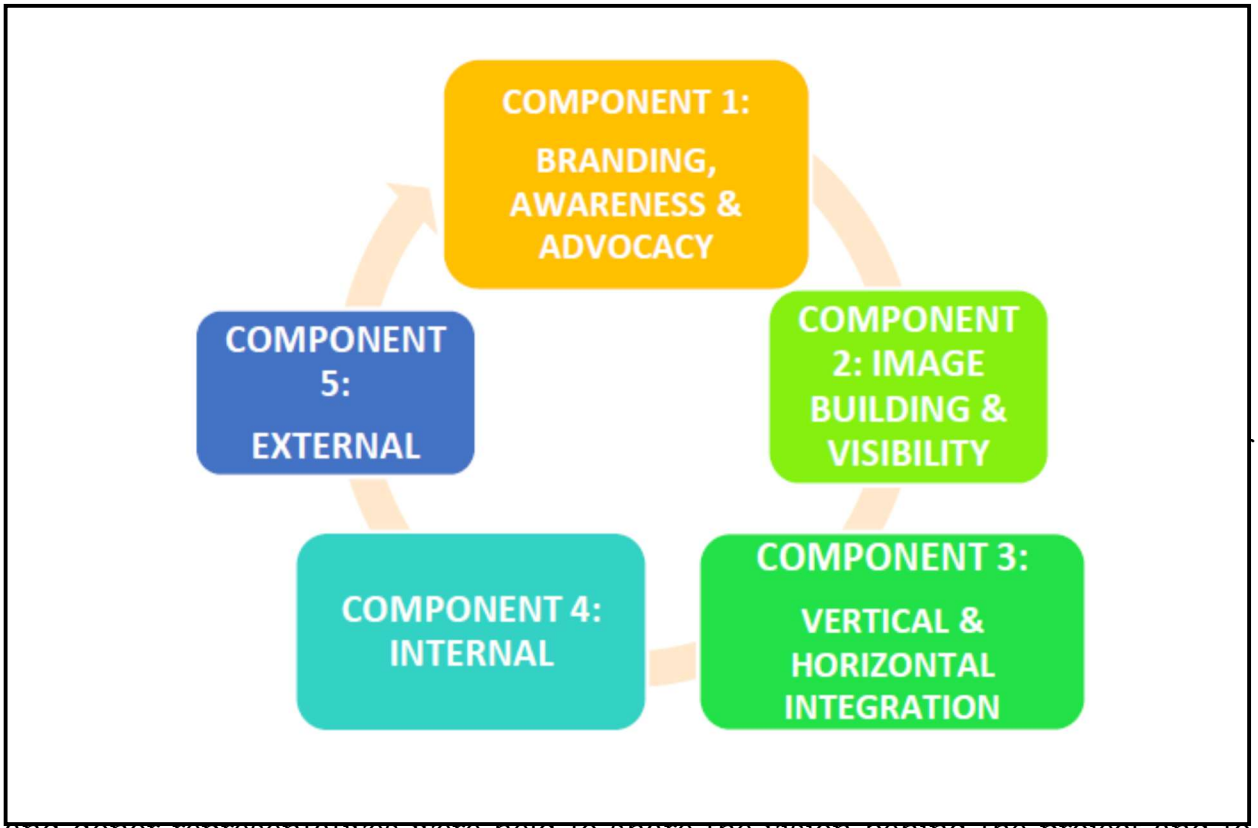
The training effort fructified into capacity building at the BHU, RHC, THQ, DHQ and the DG health directorate's level to operationalize the system and optimize its functionalities. The project activities and the Teemardar system are being run successfully which is indicative of the effectiveness and utility of the training programmes.

1.6. Development and Implementation of Communication and Branding Strategy

Communication formed an integral part of the project since sustainability depends upon how effective it has been to elicit "buy-in" of the stakeholders and to demonstrate to them the benefits of the intended project outcomes. A communication plan based on 5 pillars (as depicted in following diagram) was accordingly developed to ensure wider ownership of the project, create awareness and facilitate Teemardar’s integration horizontally with the other existing IT-based interventions in the district. The idea was also to create demand for vertical integration of local health facilities with specialized and provincial level hospitals through ICT solutions. This would ensure timely, wider and cost-effective coverage of the poor patients in particular and at the same time lead to a responsive and efficient management and delivery of health services.

Figure. 1

Communication and Branding Strategy



and donor representatives were held to share the vision behind the project and to explore possible collaborations and partnership for future expansion thus strengthening overall horizontal and vertical integration.

1.7. Participatory Surveys

The research surveys were conducted on a quarterly bases to ascertain the impact of the project interventions at the end of each quarter and to identify and implement further improvements as required. There were two different types of surveys: Patient Caregiver and Patient Satisfaction, to ascertain the effectiveness of the project from the perspective of caregivers and patients. The survey instruments were designed and dry tested by the public health experts. A baseline was established through first survey which served as first measurement of the major long-term indicators based on the Performance Indicator Tracking Table (PITT). This also helped establish or validate the indicator targets described in the Indicators of Performance Tracking Table (IPTT) in addition to collecting the data and information during the course of SMART Health/Teemardar project implementation.

This was followed by regular surveys at the end of each quarter to ascertain the extent of change in the Indicator Tracking Table. The data and findings of these surveys formed the basis for a detailed progress report. It was estimated that around 1.28 million patients will benefit from the project intervention at the selected health facilities which will include 50% women.

2. The Situation Analysis

Pakistan is facing enormous challenges in health service delivery. With a population in excess of 200 million[1], the country is the 6th most populous country in the world, and the 10th largest according to the size of its labor force. 41% of its population is aged 0-14 years and economically unproductive, while 48% is between 15-49 years. The wide prevalence of unemployment, disguised employment or informal employment add to the gravity of the situation. The country now ranks 147th out of 188 countries on the Human Development Index (HDI-2015) and 149 out of 188 on health (SDG Study- Global Burden of Disease 2016). The infant mortality rate is as high as 52.10/1000 while the maternal mortality rate stands at 178/100,000 births.

In addition, lack of social security and safety nets provided by the healthcare system including Employee Social Security Institutes and Hospitals (such as Punjab's PESSI or Baluchistan's BESSI), and the Employees Old Age Benefits Institute (EOBI) further accentuate the magnitude of the healthcare challenge. This invariably compels especially the poor to resort to the inefficient four tiered health facilities (BHU, RHC, THQ and DHQ) at district level for free health care.

The successive governments, over the years, have attempted to address the maladies and inefficiencies of the health system and launched various health programs, including vertical ones such as the National Maternal and Child Health Program, the Cancer Treatment Program, and the Aids Control Program but a closer scrutiny will reveal that many, if not all, of these programs are not adequately funded and implemented and failed to generate a positive impact on the health indicators. As per the latest statistics available, expenditure on government's Social Safety Net Programs, particularly the pro-poor programs, varied between paltry 10.4% of GDP in 2009 to 13.4% in 2013. However, with regards to the Health, the total expenditure is about 2.7% per annum in Pakistan

[1] The preliminary results of the population census, 2017 estimate the population to be in the ballpark of 207.8 million.

while countries like Afghanistan and India allocate 8.1% and 4% respectively of their budget to the health sector.

A comprehensive health policy was last devised in 2009 and applied to the 2010-15 time period. Although, the 2009's health policy was successful in conducting a fair analysis of the present state of health in the country, as it explicitly committed to achievement of the MDGs, there were key health-related issues that it overlooked including ones pertaining to provision, supply chain and efficient delivery of healthcare. Besides being exclusive and lacking prioritization, the policy failed to find space in any governmental or non-governmental implementation frameworks. Poor implementation of the positive policies, inadequate supply of medicines especially in the rural areas of Punjab and misallocation of health products have resulted in decline of the already poor health outcomes.

As for Punjab, an inspection report by Punjab Health Sector Reform Program reveals absence or vacant position of a number of staff members and poor inventory management in the government health facilities (BHUs, RHCs, THQs and DHQs); and non-availability of medicines like antibiotics, syrups and x-ray films. There is a standard list of equipment that the BHUs and RHUs have to maintain. However, at the time of inspection the essential equipment like incubator, fetal heart detector, oxygen cylinder and air-conditioner for Operation Theater were also unavailable. This palpably shows the negligence, governance dysfunction and lack of accountability in the health management system especially at the district level.

The health related information reporting process is based merely on monitoring visits by the supervisory staff including DHO, EDO Health and DCO which are informal and non-standardized. The unavailability of standardized and reliable data leads to the rationality deficit in the policy process and adversely affects the timely availability of critical medicines in case of epidemics. The absence of effective monitoring and enforcement mechanism also foments fabricated data reporting in the DDOs' offices.

2.1. Health Profile of Sheikhupura

The Health Management and Services Delivery System in Sheikhupura District, like the overall situation in Punjab, suffers from many shortcomings and dysfunctions. The absence of medical staff or vacant positions; poor management including medicines like antibiotics, syrups and x-ray films; lack of availability and

accessibility of poor and marginalized groups to medicines; inadequacy of early disease warning system, embezzlement and pilferage, among others, characterize the healthcare system.

Even the essential equipment to be maintained in THQs and DHQ like incubator, fetal heart detector, oxygen cylinder and air conditioner for operation theaters are either not available or are in a poor state. In addition, the information collection, dissemination and reporting process, as elsewhere, is based only on monitoring visits without prescribed operating procedures or standardization. This leads to policy, planning and service delivery deficits besides encouraging corrupt practices and health governance and management problems at the district level.

The following Table 1 gives the state of major health indicators of Sheikhupura compared to those from Punjab and Pakistan. It is palpably evident that the situation in Sheikhupura does not really compare favorably with either Punjab or Pakistan.

Table.1

Health Sector Indicators (Percentage % of Cases)

	Sheikhupura	Punjab	Pakistan
Children Aged 12-23 Months That Have Been Immunized	**76**	**89**	**83**
Post-Natal Consultations	**24**	**28**	**29**
Children Under 5 Suffering From Diarrhea in Past 30 Days	**13**	**11**	**11**
Infant Mortality Rate (deaths per 1000 live births)	**77**	**82**	**63**
Under 5 Infant Mortality Rate	**97**	**104**	**90**

Source: Pakistan Bureau of Statistic, Bureau of Statistics, Punjab

3. Literature Review: Healthcare Supply Chain Management

Since the Teemardar is an integrated ICT based solution for efficient and transparent health management; pro-poor delivery of health services and elimination of corruption, embezzlement etc., and involved healthcare supply

management, it is important to canvass the literature on the subject and take stock of the experiences elsewhere to assess its efficacy, effectiveness and sustainability and possible integration into the ongoing operations of local health service delivery and management. It may also be mentioned that the system is web-based tool supported by field research that profiles patients and end-users of medicines and health facilities to match them against potential providers including doctors and health staff at the selected health units in Sheikhupura.

The healthcare supply chains and service delivery are complex and cumbersome. Meijboom, et al. (2011) identify four major set of problems: communication, patient safety, waiting times, and integration. They suggest that the real problem lies between the actors and entities engaged in these sets of functions and as such, supply chain management tools can be used effectively to minimize them. A number of issues, such the availability of medical records of individual patients and information on provider performance, need to be considered and improved[2].

Malik et.al (2012) investigated the impact of transportation outsourcing on the supply chain performance of 30 pharmaceutical companies in Pakistan. They reported that outsourcing not only improved the management of the supply chain processes but also the effectiveness and efficacy of the supply chain for the pharmaceutical industry of Pakistan[3].

Some researchers have also focused on health care industry characteristics as an explanation for SCM activities and outcomes (Burns & Lee, 2008; Mantone, 2007; Buntin & Cutler, 2009). According to this perspective, SCM projects were undertaken to reduce health care costs and to respond to market place and customer demands.

Hudson et.al analyzed a web-based tool, similar in functioning and structure to Teemardar, called “Commtrack” that enables organizations in low-resource settings to better manage goods and materials - from community health workers providing iron supplements for pregnant mothers, to distributing ready-to-use-therapeutic-foods, or ensuring health clinics have adequate supplies of

[2] Meijboom, B., Schmidt-Bakx, S., and Westert, G. 2011. Supply chain management practices for improving patient-oriented care, Supply Chain Management: An International Journal, Vol.16 Issue 3.
[3] Transportation Outsourcing and Supply Chain Performance: Case of Pharmaceutical Industry of Pakistan." The South Asian Journal of Management Sciences 31 Dec. 2012. Academic One File. Web. 7 Dec. 2016.

essential medicines such as ARVs. For each of the aforementioned cases, the Commtrack tool scenarios enables patients to determine what quantities they need to order and relevant wait times associated with obtaining a shipment. It also addresses the rationing and cost-related issues for instance the disproportionate rise in the costs. The Comm Track technology has been tested, refined, and scaled through real-world deployments in Tanzania (ILS Gateway), Ghana (Early Warning. System), and Malawi (Stock), and is being rapidly scaled to other countries in Africa and Asia[4].

Another tool, a web-based PCIP was programmed in Haitian Creole and English. It encompassed all phases of the medication use process including drug ordering, filling the drug requests, distribution and dispensing of the medications in multiple settings; inventory of currently shelved medications and graphic charting of 'real-time' medication usage. The Haitian pharmacy and nursing staff were successfully trained by three pharmacists from our institution. Medication utilization improved over the course of the implementation of the PCIP system[5].

Several other studies have looked into the causal side of supply chain management successes by analyzing the factors that determine the performance of supply chain management programs. For instance, Beaman (1999) identified three performance measures as necessary components in any supply chain performance measurement system: Resource measures, output measures, and flexibility measures. Hewitt (1999) recommended customer satisfaction, return on trading assets, and flexibility of SCM activities as the measurements for supply chain performance. From a different perspective, Christopher (2000) suggested that one of the keys to success is the creation of an agile supply chain on a worldwide scale. Agility here implies rapid strategic and operational adaptation to large-scale, unpredictable changes in the business environment focusing upon eliminating the barriers to quick response.

Kowalski (2009) suggested that another approach to success in Health Care Supply Chain Management 131 is to adopt a strategic approach to health care

[4] HealthTrax: A new tool to identify and navigate dirt roads for health outreach work in Southern Zambia M. Hong1 , E. Bendavid2 , K. Mehta3 ; 1 Stanford University, Mountain View, CA/US, 2 Stanford University School of Medicine, Stanford, CA/ US, 3 University of California, San Francisco, Palo Alto, CA/US

[5] Pharmaceutical supply chain management through implementation of a hospital Pharmacy Computerized Inventory Program (PCIP) in Haiti M. Holm, M. Rudis, J. Wilson; Mayo Clinic, Rochester, MN/US.

SCM. A common mistake of the health care industry is the distinction between products and services, which may contribute to mismanagement of the health care supply chain.

A number of researchers have also identified the barriers and challenges to health care supply chain efforts. Nachtmann and Pohl (2009) identified, among others, a lack of resources to implement data standards, lack of quality information, conflicting goals across supply chain activities, data inaccuracy, and others.

The literature review provides a deeper insight into the need for contextualization the healthcare system; the role of the healthcare supply chain management and ICT and other technological interventions to improve the management and delivery of health services; and possible adaptation of the successful models implemented around the world. These constituted the basis for designing and refining the Teemardar system and its operational modalities.

4. Research Methodology

The research, as an essential component of the project, followed a standard research methodological framework based on an effective mix of primary and secondary research techniques to arrive at robust findings and conclusions. There was focus on the international best practices to underpin how similar programs were conceptualized, designed and run internationally. The primary data collection techniques like quarterly and baseline surveys, focus group discussions with the relevant governmental and non-governmental stakeholders constituted the key basis for evidence-based research.

5. Consultative Meetings

Consultative meetings were held with the Provincial Secretary and Director General health services and functionaries of the provincial government, Commissioner Lahore Division and his staff dealing with the social sector, DCO and district health outfit officials, vendors, representatives of medical and para medics, pharmacists, patients and visitors, and local representatives to seek their advice on: (a). how to improve the health management system; (b). how to improve the delivery of health services; and, (c). how to make the provincial and district health apparatus and systems more responsive to the patients' needs with an emphasis on those belonging to the lower income strata.

The participants, inter alia, emphasized the need for job security, monitoring and reporting, merit and performance based HR assessment, stability of the policy precepts, availability of working tools to better manage and deliver health services, responsive and needs based and patient centered planning and procurement systems, and the application and execution of effective transparency and accountability mechanisms.

6. Data Analysis and Findings

The baseline survey constituted the basis for ascertaining the situation at the time of the inception of the project. While the progress was estimated through quarterly surveys that acted as periodical progress reporting mechanisms. Metrics were devised to measure agreed targets and benchmarks to ensure they are in line with the project objectives and expected outcomes on a quarterly time-series basis. The metrics included patient wait times, medicine availability, perception about the general health, rating of the health outfit, staff attendance and patients' satisfaction which were considered vital to improvement in health inventory and supply chain management.

The data and information generated and the results achieved by the Teemardar project were analyzed keeping in view the various project interventions and deployments in totality for the entire project period and to prove the hypothesis that the project has not only been successful in the fulfillment of its desired objectives but has also paved the way for increased and more robust health inventory and supply chain intervention in the Sheikhupura and other districts of Pakistan.

6.1. Baseline Survey

The purpose of the SMART Health Project baseline survey was to take an initial measurement of the major long-term indicators to determine the effectiveness of the program based on the Performance Indicator Tracking Table (PITT). This aided validation of the indicator targets described in PITT besides gathering data on the existing situation at the stage of commencement of SMART Health Project. It was determined that a sample of 800 households was needed to ensure statistical significance.

Using a cluster sampling method, these households were drawn from 14 clusters. However, 945 respondents, higher than expected sample size, were included with a distribution of 470 and 475 for the treatment and controlled

locations, respectively. The control group included locations: DHQ Kasur, THQ Ferozewala, THQ Safdarabad, RHC Manawala, RHC Narang Mandi, BHU Tibbi Hambo and BHU Baumann. The survey was conducted by trained enumerators and technical teams reported having faced the following problems during the course of the survey administration:

a. Absenteeism of the doctors and medical staff in the district;
b. Their initial lack of awareness and interest in deploying the tool and resistance to adopt ICT-based intervention in general;
c. The low-level of IT skill and knowledge and the concomitant inability to appreciate the operational efficacy and capabilities of the Teemardar tool,
d. Reluctance and at times lack of cooperation by patients and the general public to respond to the questions that were sometimes intellectually and physically challenging.

6.1.1. Baseline Survey Findings

The purpose of the baseline survey, besides assessing the situation in the district, was to test the robustness of the survey instruments and provide an information base to the key stakeholders against which to monitor and assess the progress and effectiveness of the SMART Health Project during and post-implementation.

The findings of the survey revealed that the current state of basic health infrastructure and public services, the health of the people, type of problems and issues they faced and the complaints against these problems were identical in the treatment and control locations.

6.2. Quarterly Surveys

On quarterly basis, two sets of surveys were conducted; (i).Patient Caregiver Survey and, (ii). Patient Satisfaction Survey. A set of questionnaires comprising 37 questions was developed by BIPP's technical team in consultation with major stakeholders. The treatment group (project selected health outfits) comprised seven locations i.e., DHQ Sheikhupura, THQ Hospitals Muridke and Sharaqpur, RHCs Kharianwala and Farooqabad and BHUs Ghang and Farooqabad village while control group, as in the case of baseline survey, included locations: DHQ Kasur, THQ Ferozewala, THQ Safdarabad, RHC Manawala, RHC Narang Mandi, BHU Tibbi Hambo and BHU Bahumann.

The selected enumerators were trained for data collection from the treatment and control groups comprising the indoor and outdoor patients. Based on standard sampling techniques and keeping in view the minimum acceptable requirements for statistical accuracy, between 730 to 830 households were targeted in the three quarterly surveys (first quarterly survey covered 736 respondents; 2nd 779; and 3rd 829). Using a cluster sampling method, these households were drawn from 14 clusters which were selected in consultation with the BIPP technical team and the concerned stakeholders from the District Government Sheikhupura. A fairly equitable distribution of the sample from the treatment and control locations was maintained which for the 1stquarterly survey was 395:341; 2nd quarterly survey 402:377; and 3rd quarterly survey 452:378. Apart from that, inclusivity from a gender perspective was also ensured by maintaining the average male - female proportion at or around 58% and 42%. It may be recalled that the sample size of the baseline survey was 945; 470 from the treatment locations and 475 from the control.

The data collected was entered into Microsoft Excel and then imported to STATA using an analytical template developed by the BIPP's technical team. The data was also coded and cleaned before final analysis. The technical team simultaneously engaged in researching relevant secondary sources, for the purposes of comparative analysis. As a result of the cumulative assessment based on the 3 quarterly surveys, there is a clear indication of the contribution of the project towards creating awareness about the public health facilities at the decentralized locations; an increase in the demand of both the quantum and type of these services; improvement in the public satisfaction of the health services and medicines availability in the treatment group; decline in the complaints as to the inadequacy of public health services etc.

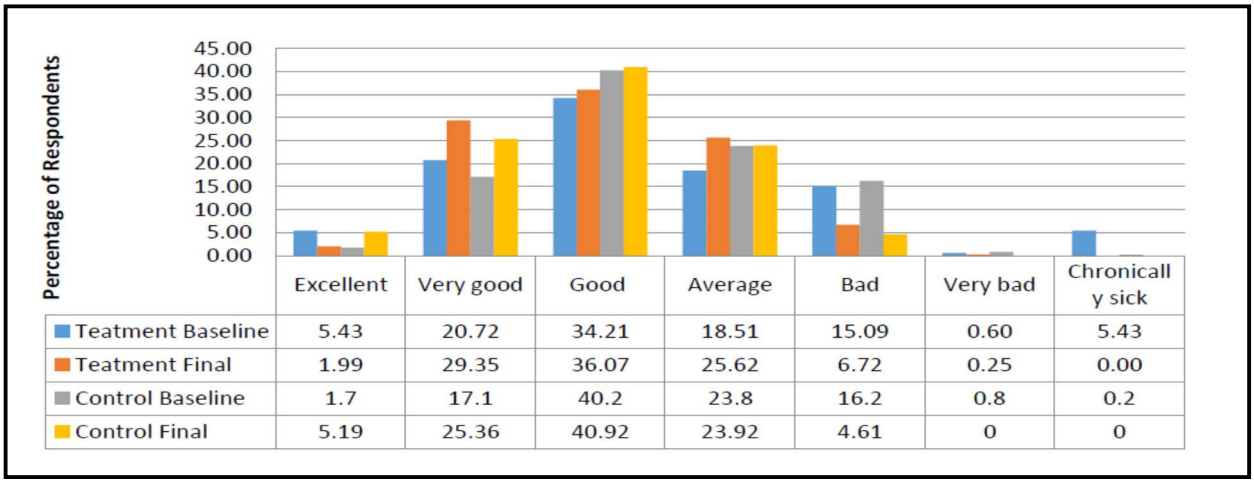
6.2.1. General Health Statistics

As is evident from the graph below, there has been a discernible improvement in the perception of the people about general public health as a result of the project interventions. In the project locations/treatment group, 29.35 % respondents rated the state of the general health as very good compared to the baseline survey which was 20.72%. Similar is the case in the respondents' assessment on their rating of services both in the "good" and "average" categories which shows 36.07% and 25.62% compared to the baseline of 34.21% and 18.51%

respectively. It may be noted that in the control group, there is hardly any improvement in both of these categories. Succinctly, therefore, the project, despite short time since the start of its implementation did have a positive impact on the state of general public health.

Figure. 2

General Health of Public



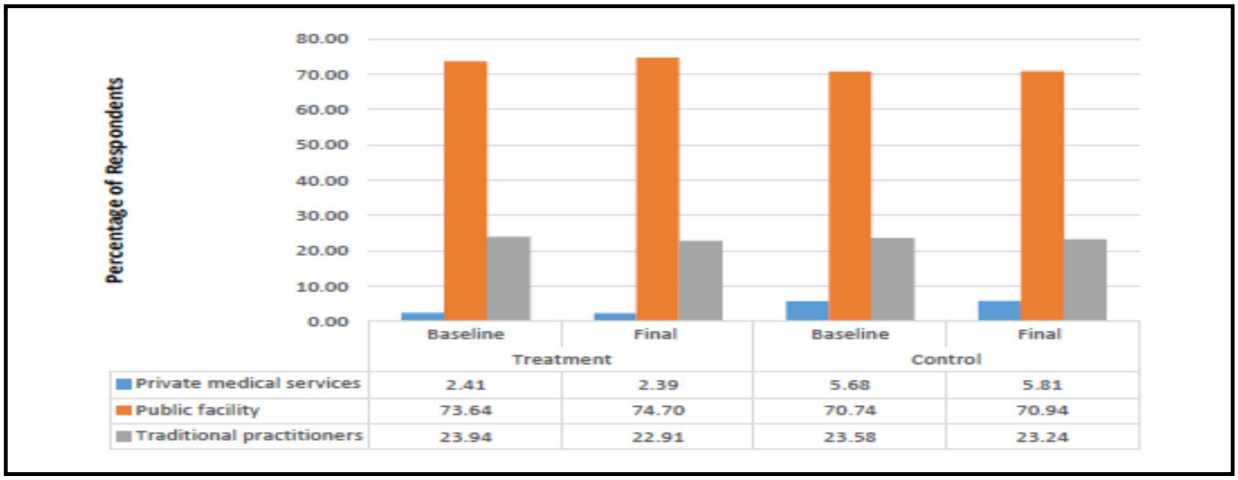
	Excellent	Very good	Good	Average	Bad	Very bad	Chronically sick
Teatment Baseline	5.43	20.72	34.21	18.51	15.09	0.60	5.43
Teatment Final	1.99	29.35	36.07	25.62	6.72	0.25	0.00
Control Baseline	1.7	17.1	40.2	23.8	16.2	0.8	0.2
Control Final	5.19	25.36	40.92	23.92	4.61	0	0

6.2.2. Hospital Preference Data

The survey included set of questions to ascertain the preferences of the respondents and people as to the type of health services i.e., private medical services, public facility or traditional practitioners at the inception of the project and towards the last leg of project implementation. As depicted by the Graph below, the result from the final survey shows a positive change though slight, by the interventions in the control group as to their overall preference for public health system and decline on the reliability of the traditional practitioners. Their preference for the public facilities has increased up to 75% approximately. In the control group, for these three preferences the results remained more or less the same.

Figure. 3

Hospital Preference



	Treatment		Control	
	Baseline	Final	Baseline	Final
Private medical services	2.41	2.39	5.68	5.81
Public facility	73.64	74.70	70.74	70.94
Traditional practitioners	23.94	22.91	23.58	23.24

6.2.3. Data on Satisfaction with Government Health Facilities

The survey revealed that people prefer the public sector health facilities over private and traditional when they were asked about their satisfaction with public sector facilities. In treatment group, 25.62% of people were very satisfied which was significantly higher than the baseline survey (19.15%). The percentage of people who expressed dissatisfaction with the government health services is also dropping. On the parallel side, control group's level of satisfaction is shrinking as compared to baseline survey. The percentage of the people who are not satisfied at all with the services has increased to 17.3% in control group.

6.2.4. Data on Satisfaction with the Availability of Medicines

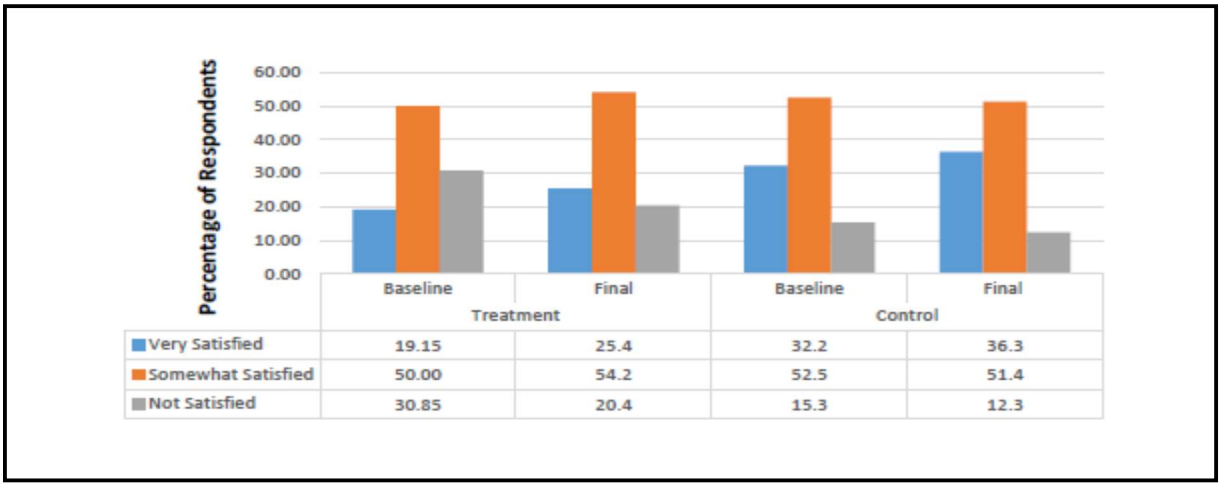
The satisfaction of people with the availability of medicines has also registered a visible increase in the treatment group. 25.4% of the people are very satisfied with the availability of medicines at government hospitals whereas the percentage of people who were not satisfied is declining. It was 30.85% in the baseline survey which is now 20%, a sharp decrease of 10%. In the control group, while the respondents felt some improvement but when compared with the treatment group, these improvements are not as significance.

Figure. 4

Satisfaction with Government Health Facility

Figure. 5

Satisfaction with availability of medicines



	Treatment		Control	
	Baseline	Final	Baseline	Final
Very Satisfied	19.15	25.4	32.2	36.3
Somewhat Satisfied	50.00	54.2	52.5	51.4
Not Satisfied	30.85	20.4	15.3	12.3

6.2.5. Hospital Recommendation

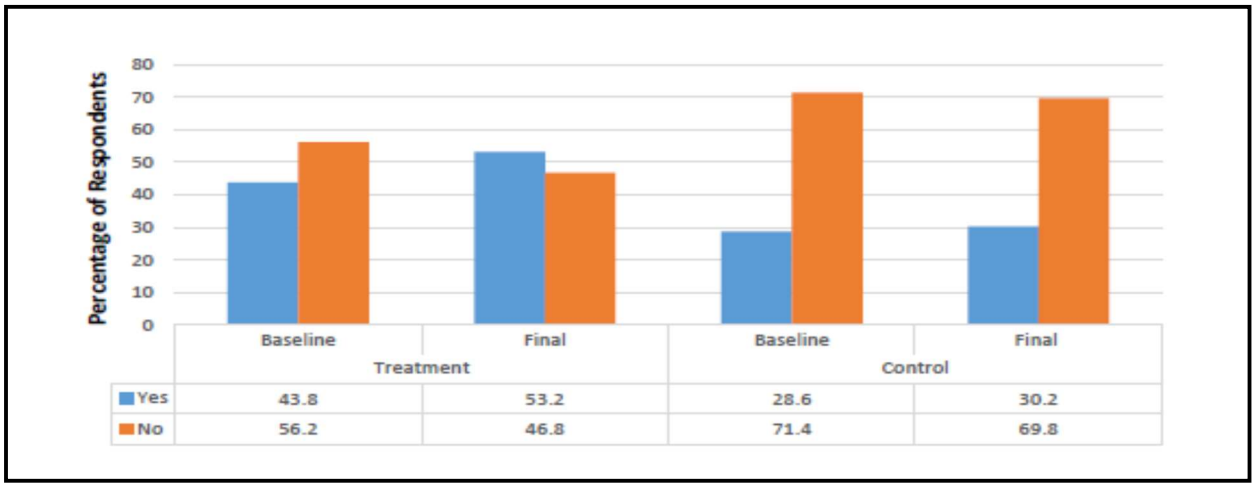
Along with investigating their satisfaction from the services of the government hospitals, availability of medicines etc., the respondents were asked if they would recommend these hospitals at the decentralized locations i.e., BHUs, RHCs, THQ and DHQ to others desirous of availing or needing medical services. In the treatment group, the percentage of people recommending these hospitals showed an increase as compared to baseline survey. About 53.2% of the people would recommend government hospitals compared to 43.8% in the baseline

surveys they are satisfied with their services. In control group the survey did not come up with a significant change.

6.3. Patients' Satisfaction Survey

A three-tiered response scale to record patient satisfaction for both treatment and control groups i.e., very poor, fairly poor and very good. The number of survey respondents was also rationalized based on their capability to provide air and informed response to ensure quality of data and information generated by the surveys for analysis.

Figure. 6



Will you Recommend this Hospital to Others

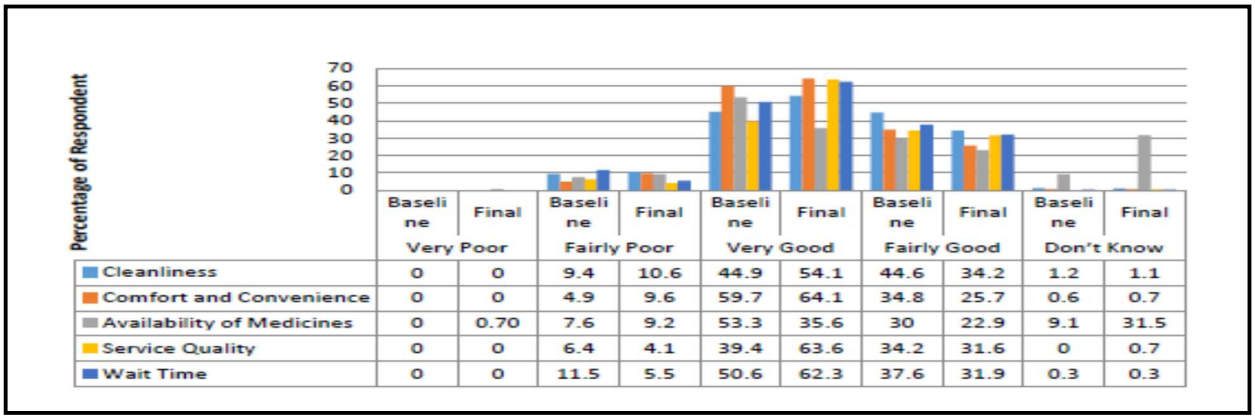
In the Patients' Satisfaction Survey, the results for both treatment and control groups are not only satisfactory but present an overall ameliorating picture of the general health of people. 91% of the treatment group reported very good, good and average health compared to the 77.7% baseline estimate. For the control group, the very good, good and average response was reported by 81.75% of the baseline survey population.

6.3.1. Rating of the Dispensary

The survey revealed very interesting findings which validated the effectiveness and positive impact of the project. Cleanliness, service quality and waiting time showed significant improvement, 64.1 % of people who feel comfortable and convenient at availing dispensary services rated these very good. Waiting time at dispensaries has also reduced in final survey as compared to the baseline survey.

Figure. 7

Rating of the Dispensary



	Very Poor		Fairly Poor		Very Good		Fairly Good		Don't Know	
	Baseline	Final	Baseline	Final	Baseline	Final	Baseline	Final	Baseline	Final
Cleanliness	0	0	9.4	10.6	44.9	54.1	44.6	34.2	1.2	1.1
Comfort and Convenience	0	0	4.9	9.6	59.7	64.1	34.8	25.7	0.6	0.7
Availability of Medicines	0	0.70	7.6	9.2	53.3	35.6	30	22.9	9.1	31.5
Service Quality	0	0	6.4	4.1	39.4	63.6	34.2	31.6	0	0.7
Wait Time	0	0	11.5	5.5	50.6	62.3	37.6	31.9	0.3	0.3

6.3.2. Medicine Distribution and Staff Service Rated Compared to Previous Visits

Respondents were then asked to rate the medicine distribution system and the staff services provided to them in the hospitals. The rating was categorized as: received services, efficiency of services and service delivery as compared to previous visits. There is a positive change in percentage in all the categories i.e., 61.5%, 59.2% and 57.7% respectively as compared to the baseline survey.

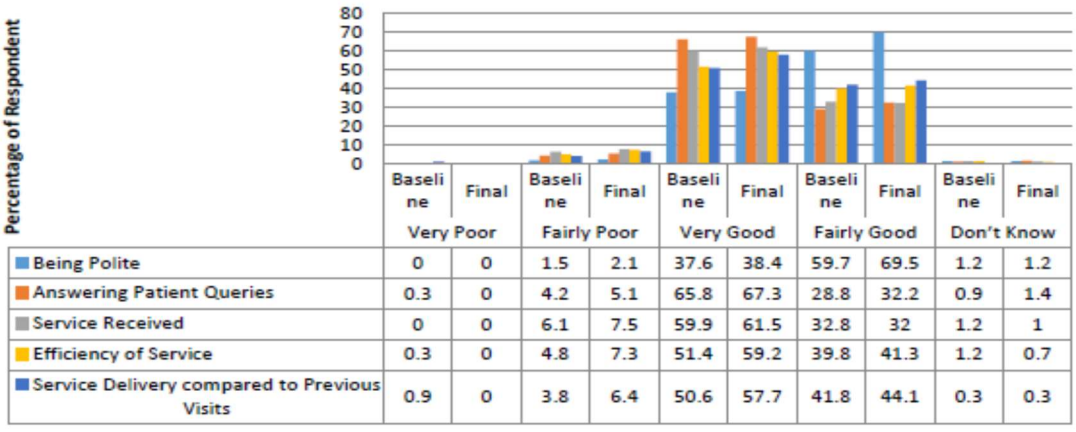
6.3.3. Beneficiary Count

During the three quarterly surveys after the commissioning of TEEMARDAR, a total of 863,654 beneficiaries were served through the

system. However, a comparison between the baseline survey and the last quarter of the project reveals that all targeted health facilities witnessed increase in the patient traffic except RHC Farooqabad which showed a slight decline presumably on account of seasonal and coincidental fluctuations. Over all there has been an increase of 6.96% beneficiaries in the targeted health facilities within the same budget. While this denotes the efficacy of the system, it is premature to make a conclusive judgment as the actual impact of the system, as earlier stated, could only be realized after evaluating the data of at least two seasons.

Figure. 8

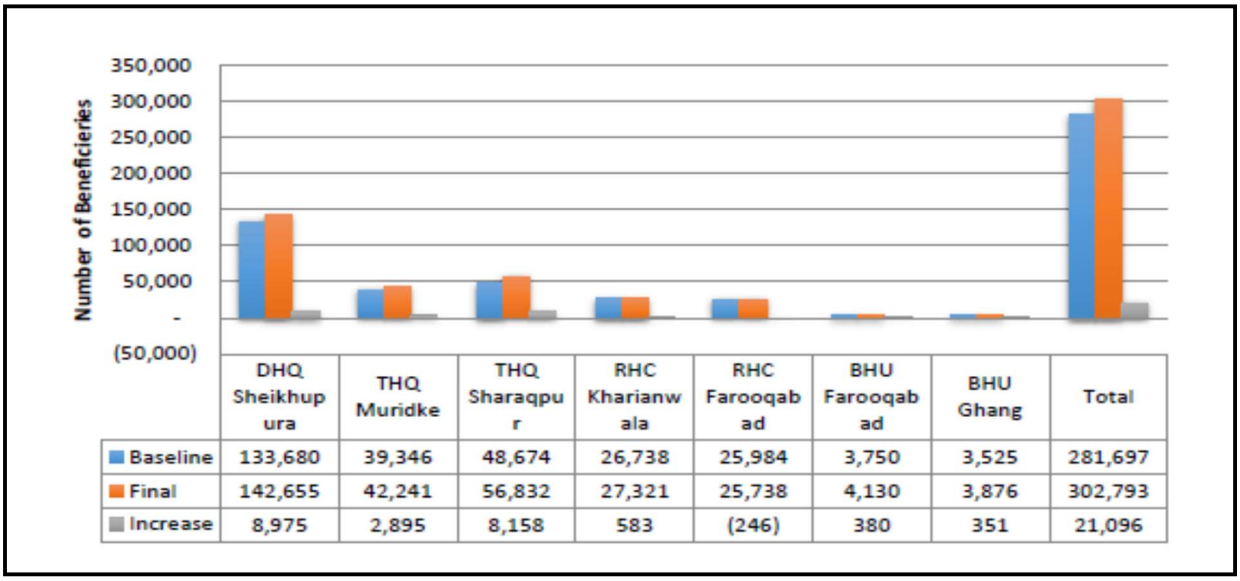
Medicine Distribution and Staff Service Rated Compared to Previous Visits



	Very Poor		Fairly Poor		Very Good		Fairly Good		Don't Know	
	Baseline	Final	Baseline	Final	Baseline	Final	Baseline	Final	Baseline	Final
Being Polite	0	0	1.5	2.1	37.6	38.4	59.7	69.5	1.2	1.2
Answering Patient Queries	0.3	0	4.2	5.1	65.8	67.3	28.8	32.2	0.9	1.4
Service Received	0	0	6.1	7.5	59.9	61.5	32.8	32	1.2	1
Efficiency of Service	0.3	0	4.8	7.3	51.4	59.2	39.8	41.3	1.2	0.7
Service Delivery compared to Previous Visits	0.9	0	3.8	6.4	50.6	57.7	41.8	44.1	0.3	0.3

Figure. 9

TEEMARDAR
Beneficiary Count



	DHQ Sheikhupura	THQ Muridke	THQ Sharaqpur	RHC Kharianwala	RHC Farooqabad	BHU Farooqabad	BHU Ghang	Total
Baseline	133,680	39,346	48,674	26,738	25,984	3,750	3,525	281,697
Final	142,655	42,241	56,832	27,321	25,738	4,130	3,876	302,793
Increase	8,975	2,895	8,158	583	(246)	380	351	21,096

It should be noted that the DHQ Sheikhupura underwent a change of roughly 9000 patients ending with patients in excess of 140,000. The largest percentage change in the number of patients was recorded in the THQ Sharaqpur. It is also heartening to note that out of the total beneficiaries, approximately 48.3% are women.

7. Achievements and Results

The project has achieved all the envisioned outcomes and results both in the health management apparatus at the selected location and the quality of responsive health services delivery. The foremost outcomes have been the establishment of the disease early warning system, medical officer's attendance and performance evaluation, and live reporting system to be utilized for capacity building, assessment, monitoring and evaluation purposes by the director general of health service. A dashboard for the administrative department to monitor the availability of medicines and to use the collected information for development of related monitoring and evaluation programs within the health sector has also been

designed and implemented to assist the senior health management in monitoring, reporting and planning functions.

7.1. Management of Health Services

The Teemardar project has ensured full transparency and inclusiveness of health governance system for the selected locations and has also introduced accountability mechanism. The system enables the supervisory tiers on real time basis to monitor the performance of Medical Officers (MO) and the associated staff at the selected BHU, RHCs, THQs and DHQ as well as availability and distribution of medicines. The MOs performance evaluation is ensured by recording each patient profile, prescription issued along with MO's name.

As a result of series of training sessions and workshops, the capacity of the management and service delivery staff has been enormously strengthened for planning and timely procurement of the medicines besides familiarizing them with the new ICT tools and techniques to conduct the health delivery services. The EDO Health, DOH, MOs, pharmacy staff, computer operators etc. involved in the implementation of Teemardar are now fully trained and equipped with the competence-skills to execute their respective roles and responsibilities and ensure better management of health apparatus at the district level.

The *Dashboard* is a unique and effective live monitoring, reporting and management system that can be accessed freely by stakeholders involved with the health sector in Sheikhupura to obtain a snapshot of the district's demographics in general and find updated statistics on monthly medicine sales, medicine stocks and a district-wise disease breakdown. While the dashboard is an essential component of the project itself, its main utility lies in monitoring and planning health interventions to ensure not only efficient management of health services but also pro-poor service delivery. The Administrative Department can also monitor on-line availability of medicines in real time in the district at all locations and can also use this information for responsive and effective development programs in the health sector.

7.2. Early Disease Warning System

Another important achievement/outcome of the project is the establishment of a preliminary *Early Disease Warning System.* The data generated by the Teemardar System, its online real time availability and the functionality of the Dashboard provide the disease profile of the BHUs, RHCs, THQs and the DHQ as

also disease incidence over time. The EDO/DOH at the district level and the DG Health Services at the Provincial level can easily deduce the seasonal fluctuation of the disease pattern, the intensity and frequency of disease in a particular BHU and forecast with reasonable degree of accuracy the likelihood of widespread occurrence of a particular disease. Based on this analysis early disease warning could be issued and action plan both preventive and curative formulated and implemented to control and curb the disease.

7.3. Inventory Management

Automated inventory management is an integral part of the Teemardar system and constitutes its kernel. It has prevented health services against false procurements, reduced the inventory management failures, fixed information gaps in the system, and resulted in financial savings. It also supported the operation of accurate Early Warning System on spread of diseases / epidemics. Although World Health Organization (WHO) has established a Disease Early Warning System (DEWS) in Pakistan, however, to-date, no studies exist which correlate disease incidences with the actual distribution of relevant medicines. This has been one of the main achievements objectives of the SMART Health project.

7.4. Health Services Delivery

The project has ensured inclusive and patients' centered delivery of health services. The patients have direct and transparent access to the information displayed publicly on the screen at the health facility e.g., BHU including availability of medicines stocks and critical health messages. This not only sensitizes the patients but also empower and educate them on the functioning and efficacy of the healthcare system. The patients' tracking feature provides complete history of patients' disease(s).

7.5. Expanded Coverage

The Teemardar project was initially envisaged to cover only two Basic Health Units apart from 2 RHCs, THQs and DHQ Sheikhupura. However, through some innovative process remapping and design engineering, the integrated ICT solution developed by the project has ensured inventory management of all the 79 BHUs, virtually covering the entire basic health system of district. This indeed was one of the biggest achievement of the project with no extra budgetary costs.

8. Constraints

It is important to identify some of the contextual constraints that significantly impacted the efficacy of the project interventions. These are:

a) *Time and duration of the project:* The pattern of disease especially in the rural and peri-urban areas normally follows seasonal cycles characterized by distinct variations in the incidence of diseases. It requires at least two seasonal cycles' disease pattern - to measure with a degree of fair accuracy - the outcome and impact of health related interventions. In the case of SMART Health/Teemardar project, because of the duration and time period of the project, only one seasonal cycle's experience was available to assess whether or not the project contributed in alleviating the existing state of health management and health services delivery.

b) *Technology driven interventions:* In the state apparatus at the decentralized level where there is a little appetite to adopt and use technological tools in the conduct of state business, the absorption capacity for new technology and tools and doing things "differently" continues to pose a major challenge. This is further aggravated by "status quo" orientation. The perceived curb on powers and perks and discretion and authority foment resistance to change especially when performance and delivery are monitored for results and accountability. These obstacles need to be overcome not only through series of orientation workshops and training sessions but also through demonstration of visible efficiency gains.

c) *Optimal Impact of Technological Interventions:* For technological interventions to create optimal impact, it is extremely important that there is a conducive environment for their horizontal and vertical integration or else these interventions lead to partial solutions and become "stand alone systems" with the results that there is likelihood of achieving only sub-optimal impact and outcomes. While Teemardar project has been rated as extremely successful by the district health functionaries at the project locations to the extent that reportedly they do not visualize operating health services without this solution, the fact remains that in the absence of its vertical linkage through comprehensive ICT integration solution with the tertiary and specialized hospitals, and similarly businesses process integration with the entire health management cycle, the full potential of the system cannot be realized.

d) *The policy stability, continuity of the operational procedures* and reasonable predictability in the retention of project/system related trained HR are sine qua non for the success and sustainability of the project results and outcomes. The ICT-related interventions are fashioned and designed as per well-defined business case, process mapping and decision making processes. Any drastic departure from the existing policy, institutional and operational frameworks is likely to dilute the design efficacy and thus effectiveness of the new systems and interventions.

Against this backdrop, following are the more specific research findings based on the data and information generated by the surveys, experience gained during the course of the project implementation and consultations with the stakeholders.

9. Recommendations

9.1. Policy

The need for development of a coherent health policy in Pakistan is more acute than ever before. The country's two South Asian neighbors, India and Bangladesh have continuously made and revised integrated national health plans while Pakistan has never had one since 2009. The 2009 national health policy covered areas like development and provision of essential health services package, human resource development and management, generation of a system of reliable health information, adoption of appropriate health technology, enhancement of health budgets and governance and accountability but deeper analysis and reflections on the outcomes achieved by the policy reveal that the lack of effective implementation has reduced its effectiveness.

The recently published IT policy of Punjab focuses on IT interventions in all sectors including health. However, ideas regarding building online tracking tools similar to Teemardar have not been adequately acted upon in the policy frameworks as roadmaps for the future essentially on account of lack of commitment and intent of both the public and private sectors. The government, as a policy precept, needs to upscale and adopt locally produced, tested and deployed tools like Teemardar alongside the international best practice supply chain and inventory management tools like Commtrack to enable the involvement of ICT in the health sector.

The adoption of health based ICT (including EMR, EHR, PHR) could induct a paradigmatic shift in the health care environment to ensure high quality delivery of services to all patients. It can ensure pro poor health management and service delivery and bridge the spatial disparities by vertically integrating the local rural health outfits to tertiary health care system. It could be a powerful safety and social security tool for the poor. Patients access to medical information and records can help them better engage and manage their healthcare. Some of the specific policy recommendations for the government are:

a. Government should formulate and implement eHealth policy as an inextricable component of its overall health management framework to make use of technological and ICT advancements in ensuring pro-poor and cost-effective comprehensive health coverage of rural as well as urban populations;
b. Teemardar project has successfully demonstrated the quantitative as well as qualitative benefits which can be achieved to improve the health indicators and outcomes through adoption of ICT integrated solutions. The government should incentivize the private sector to engage in the eHealth sector and to develop, design and improve these solutions to complement government's efforts in providing cost-effective, timely and comprehensive healthcare (including tertiary level medical consultancy services) to the people. However, equity considerations should be built into such frameworks to guard against the institutionalized
c. Commercialism and possible exclusion of the poor from the benefits of eHealth system.
d. Tele-medicine strategies and programmes should prominently figure in the medium-term and annual development plans to improve quality and coverage of health services at affordable costs and also effectively deal with the existing and emerging diseases, both communicable and non-communicable. This is important because of rapid changes both in terms of longevity and life style as well as environmental impact on human health due to climate change.
e. A regular outreach campaign needs to be mounted to empower poor patients and educate them to become self-managing health conscious clients of the eHealth system. This will not only ensure health equity but

also accelerate the process of significantly improving health indices and outcomes in the poor areas.

9.2. Institutional

The state health apparatus, provincial health departments, coordination offices of the district government, provincial finance departments, private sector health organizations including private hospitals, clinics, pharmacies and research organizations and academics associated with the health sector need to play a more active and robust role by sharing and adopting eHealth tools for institutionalizing the pro-poor health services delivery.

Lack of streamlined health procedures and processes is widely prevalent problem within BHU, THQs, RHCs and other medical facilities which compromises the efficiency of service delivery in the sector. The ICT integrated solutions not only simplify these procedures but also lead to significant efficiency gains especially in reducing the time and transaction costs. Better inventory management, distribution and medicine dispensation through ICT based health systems guard against the possible stock pilferage and embezzlement as also ensure better management, planning and monitoring of the health services. The government departments especially health and finance should adopt and integrate these solutions in their business processes.

Public-private partnerships can play a vital role in the health sector transformation that Teemardar tool envisages. Therefore, an institutional framework that brings on board key stakeholders from the cluster of public-private-non-governmental institutions, based on ideas of integrative, collaborative and synergistic work, must be evolved to usher in the expected health sector reforms. This should involve and lead to:

i. a fully functional, reliable and comprehensive health management system based on ICT solutions to record and share on real time basis information on births and deaths, diseases and frequency of their occurrence as also availability and stock of medicines from the local to tertiary levels;

ii. Facilitation of, in particular, decentralized planning, monitoring and delivery of health services. This could bring about a transformative change in the delivery of health services in the rural, deprived and poor areas at the union council and BHUs level;

iii. establishment of Tele-medicines nodal points to ensure equal access of poor to professional and expert medical advice irrespective of their remote location;

iv. Capacity building at the district levels to make full use of ICT related interventions and solutions. This would also include properly equipping the telemedicine centers with digital diagnostic equipment to be able to link up to the tertiary/specialized hospitals.

The Disease Early Warning System (DEWS) as developed by Teemardar project has enormous potential to help government respond to the disasters and health emergencies all across the country. This should be suitably complemented with Integrated Disease Surveillance capability to detect early warning signals of impending outbreaks to initiate effective and timely response. DEWS should be an integral part of health emergency intelligence system and plans with a dedicated Unit within the Health Department to ensure its functional and operational efficiency.

The Government should also strengthen the statistical and data management capacity of the office of the DG health services to collate, synthesize and analyze data generated from various sources and establish a reliable Health Management Information System. This involves massive coordination effort among the disparate ICT related interventions in the health sector to rationalize data generation and produce coherent set of information and data capable of supporting rational decision making and instituting effective reporting, monitoring and accountability systems for better health sector management and service delivery. This would, a priori, entail upgrade and training of data processing and tabulation personnel. Likewise, the district health tier should have a statistical cell to coordinate data and information and vertically integrate it with the provincial HMIS.

The government should have an institutional capacity to launch periodic assessments in order to undertake corrective measures to identify and set right the possible architectural aberrations in the rural healthcare delivery system. This will ensure accelerated socio-economic development as well as improvement in the quality of life of rural poor.

9.3. Financial

The financial side of the public healthcare system needs serious formalization. The public health expenditures are trivialized when compared with the increasing private health expenditures in Pakistan. In South Asia, Pakistan is the only country with less than 3% of budget allocated to the health sector (ranges between 2.5 to 2.7% over the years). Even countries like India allocate around 4%; Bangladesh around 3.7% and Afghanistan more than 8% of the budget to the health sector.

While there is an urgent need for the government to spend an increasing amount of Pakistan's public sector development budget on building health infrastructure, part of the promise must reflect in the establishment of IT infrastructure and ICT based integrated solutions like Teemardar to bring about real improvements in the coverage of quality healthcare, especially for the poor.

The rational and responsive utilization of the budget geared to the health needs of the poor together with effective accountability mechanisms (as ensured by ICT integrated solutions like Teemardar) could ensure financial efficiency, eradication of embezzlement, pilferage and wastage of health funds.

The envisaged ICT-intervention will require significant financial outlays from the government. This will obviously create incentives, confidence and purpose for the private sector to buy in and contribute the much needed financial resources. The Teemardar has impacted around 0.4 million people already and the number is only going to increase in the coming months. However, this was achieved through generous funding from DFID and SNG. If it has to be scaled-up to other districts in Punjab/Pakistan then a serious financial commitment from the government is required. If private sector is also incentivized through fiscal measures (tax holidays, incubation centers, incentive payments, access to finance etc.,) related to eHealth, the access of cost effective and quality healthcare to the people will expand enormously. It should also be recognized that in the long run, there will be huge financial and economic gains to the country though contribution of better healthcare in human capital formation and productivity. Indeed health is human capital itself and an input to producing other forms of human capital.

In recent years, the trend for increasing health costs to individuals is increasing significantly. The evidence shows that prevention can be cost-effective, provide value for money and give good returns on investment in short and longer term (WHO Regional Office for Europe: the case for investment in public health).

Investing in public health generates cost effective health outcomes and contribute to wider sustainability with economic, social and environmental benefits.

Improvement in health accounted for fully half of the economic growth in UK in the first 2 centuries of industrialization (Robert Fogelm1993) It may also be pointed out that while Health is just one of the SD Goals (Goal 3 "ensure healthy lives and promote well-being for all at all ages), it is directly or indirectly represented in every SDG e.g.,: peace and stability (SDG 16) positively impacts the mental and physical health of communities; greater access to energy (SDG-7) increases the services hospitals and health outfits provide; climate change (SDG-3) changes eco-systems to introduce of increase incidence of vector born diseases.

10. Conclusion

As part of the agreed implementation framework for the project, the implementing agency, the Shahid Javed Burki Institute of Public Policy at NetSol, has devised a workable and implementable sustainability and exit plan for the project whereby certain mechanisms and structures could be evolved to ensure that Teemardar carries on as a health support and assistance tool. Three distinct and broad levels of sustainability had to be ensured; policy, institutional and financial. The project implementing team at the Shahid Javed Burki Institute of Public Policy at NetSol (BIPP) has ensured that plans of action – to achieve all three levels of sustainability - are devised and put in place before an exit is finally performed.

The formulated plans and structural mechanisms support a coherent and consistent policy framework for the project. Constant assertions and commitments to a central policy framework that was agreed upon by the donor and implementing agencies were made which ensured clarity and sense of purpose towards achievement of common policy goal. The targeted objectives of the project foremost of which was improvement in availability of medicines, reduction in wait times and efficiency enhancement in overall service delivery have been successfully achieved.

The relevant government departments and private sector organizations that can adopt and sustain the project financially have also been brought on-board to explore opportunities for collaboration. Financial sustainability is key to ensuring quality of the results that tool can produce. For the purpose, financial projections

and sustainability plans that consider the current costs of the intervention and potential increases in the future are already developed. What is required now is the will and commitment of the government to internalize the project activities in the on-going regular health delivery plans and programs and upscale the experience in due course so that the full benefits of the system are realized in terms of efficient and responsive health management and pro-poor delivery of totality of health services by connecting local BHU with DHQ and tertiary health facilities.

A word of gratitude is due for DFID/SNG for having funded this project. But for their involvement, it would not have been possible to accomplish what the project has achieved The District Government including the DCO/DC, EDO Health, DOH and the local Medical Officers and staff also deserve full commendation for their dedication and commitment to change the status quo and use integrated ICT solution Teemardar for better health management and service delivery at the decentralized level.

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