CASE STUDY

Diagnostic Services for Sexually Transmitted Infections in Three Indian States:
Discerning Market Potential within a Diverse Private Sector

Submitted to:
Bill and Melinda Gates Foundation
Seattle, WA 98102

Prepared by:
Erin McCarthy, MPP
Jacquelyn K. Beals, PhD
Joan Haffey, MPH
Leslie Ragan Lugo, MA
Steven A. Harvey, PhD

Center for Human Services
University Research Co., LLC
Case Study

Diagnostic Services for Sexually Transmitted Infections in Three Indian States:

*Discerning Market Potential within a Diverse Private Sector*

Prepared for the Bill & Melinda Gates Foundation
Seattle, Washington

By: Erin McCarthy, MPP
    Jacquelyn K. Beals, PhD
    Joan Haffey, MPH
    Leslie Ragan Lugo, MA
    Steven A. Harvey, PhD

September 2010
Center for Human Services: The CHS mission is to help clients meet today’s challenges and take advantage of tomorrow’s opportunities by providing a comprehensive array of education, training, advocacy, and health-related programs and services.


For more information on this report, please contact Steven A. Harvey at sharvey@urc-chs.com.
# Table of Contents

Abbreviations .................................................................................................................. iii
Foreword .......................................................................................................................... v
Executive Summary ......................................................................................................... ix
Introduction .................................................................................................................... 1
Data Collection Methods ............................................................................................... 1
Background ...................................................................................................................... 2
  Epidemiology of STIs ..................................................................................................... 2
  Diagnostic tools for STIs ............................................................................................... 3
  Current national approaches to STI care and treatment ................................................. 4
Private-Sector Providers of STI Diagnostics ................................................................. 5
  For-profit providers ....................................................................................................... 5
  Non-profit providers ...................................................................................................... 9
  Current Approaches of Private-Sector Providers to STI Diagnostics ......................... 10
  Potential Markets for STI Diagnostics among Private-Sector Providers ..................... 11
Conclusions and Recommendations ............................................................................. 14
  Conclusions ................................................................................................................. 14
  Recommendations ...................................................................................................... 15
References ....................................................................................................................... 17
Appendix: Interviews that Contributed to this Case Study ............................................. 19
Table of Figures and Tables

Figures
Figure 1: The Indian states included in this case study: Andhra Pradesh, Rajasthan, West Bengal
Figure 2: A busy private pharmacy in New Delhi. Private consultations are impossible in such an atmosphere.

Tables
Table 1: Overview of private-sector providers of STI diagnostic services
Table 2: Characteristics of Ideal STI Rapid Tests According to Respondents
Table 3: Private-sector Markets for STI diagnostic services
**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Acquired immunodeficiency syndrome</td>
</tr>
<tr>
<td>ART</td>
<td>Anti-retroviral therapy</td>
</tr>
<tr>
<td>CBO</td>
<td>Community-based organization</td>
</tr>
<tr>
<td>CHAI</td>
<td>Catholic Health Association of India</td>
</tr>
<tr>
<td>CHS</td>
<td>Center for Human Services</td>
</tr>
<tr>
<td>CMAI</td>
<td>Christian Medical Association of India</td>
</tr>
<tr>
<td>CSW</td>
<td>Commercial sex worker</td>
</tr>
<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
</tr>
<tr>
<td>ELISA</td>
<td>Enzyme-linked immunosorbent assay</td>
</tr>
<tr>
<td>FTA-ABS</td>
<td>Fluorescent treponemal antibody absorption test</td>
</tr>
<tr>
<td>HIV</td>
<td>Human immunodeficiency virus</td>
</tr>
<tr>
<td>HRG</td>
<td>High-risk group</td>
</tr>
<tr>
<td>ICTC</td>
<td>Integrated [HIV] counseling and treatment center</td>
</tr>
<tr>
<td>IDU</td>
<td>Injecting drug user</td>
</tr>
<tr>
<td>MSM</td>
<td>Men who have sex with men</td>
</tr>
<tr>
<td>NAAT</td>
<td>Nucleic acid amplification tests</td>
</tr>
<tr>
<td>NACO</td>
<td>National AIDS Control Organization</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-governmental organization</td>
</tr>
<tr>
<td>NRHM</td>
<td>National Rural Health Mission</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase chain reaction</td>
</tr>
<tr>
<td>POC</td>
<td>Point-of-care</td>
</tr>
<tr>
<td>PID</td>
<td>Pelvic inflammatory disease</td>
</tr>
<tr>
<td>RCH</td>
<td>Reproductive and child health</td>
</tr>
<tr>
<td>RDT</td>
<td>Rapid diagnostic test</td>
</tr>
<tr>
<td>RMP</td>
<td>Registered medical practitioner</td>
</tr>
<tr>
<td>RPR</td>
<td>Rapid plasma reagin</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>SACS</td>
<td>State AIDS Control Society</td>
</tr>
<tr>
<td>SCM</td>
<td>Syndromic case management</td>
</tr>
<tr>
<td>STI</td>
<td>Sexually transmitted infection</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>TMA</td>
<td>Transmission mediated amplification</td>
</tr>
<tr>
<td>TPHA</td>
<td><em>Treponema pallidum</em> haemagglutination test</td>
</tr>
<tr>
<td>VDRL</td>
<td>Venereal Disease Research Laboratory test</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
FOREWORD

The spread of infectious diseases is a critical concern in global health. Despite recent advances in the availability of powerful drugs, many treatable infectious diseases continue to exact a terrible toll worldwide, particularly in developing countries. The World Health Organization (WHO) has identified respiratory disease as a leading cause of infant death in countries with high childhood mortality rates. Diarrheal diseases affect an estimated 1–4 billion children under age five in developing countries, causing about 2.5 million deaths (85% of these in the poorest parts of the world); in some countries, diarrheal diseases cause more than 20% of deaths in children under age five. Malaria is estimated to cause 1–3 million deaths and 500 million to 5 billion episodes of clinical illness, primarily in Africa. Roughly one third of the world’s people are infected with the tuberculosis (TB) bacillus and as many as 2 million die of the disease annually. The highest rates of TB occur in some of the world’s poorest countries, exacting an enormous economic toll. Particularly among people with HIV/AIDS, TB is the leading cause of death.

In their 2009 AIDS epidemic update, the WHO and UNAIDS estimated that, worldwide, 2.1 million children under 15 years old were living with HIV in 2008. Other sexually transmitted infections (STIs) such as gonorrhea and chlamydia (often so asymptomatic that they are considered “silent” infections) pose significant health risks, with prevalence as high as 40% even among low-risk populations in Africa. And syphilis continues to be a major health problem during pregnancy, with an estimated prevalence as high as 18% among pregnant women attending antenatal centers in Africa.

To make treatment of infectious diseases more accessible, it is essential to: i) identify those who require treatment; ii) administer and monitor appropriate treatment; and, importantly, iii) prevent overtreatment, which can increase the prevalence of drug-resistant microbes. The diagnostic tools currently used in developing countries have many limitations and are largely inadequate for the health needs they address. There is a growing need to develop and test more effective and more accessible diagnostic tools for specific infectious diseases – tools that are tailored to developing-country realities.

In 2004, the Global Health Diagnostics Forum of the Bill and Melinda Gates Foundation recognized the importance of access to appropriate and accurate diagnostic tools for evaluating and improving global health. The forum recommended a focus on six diseases or syndromes that cause disease burdens among the highest in the developing world: acute lower respiratory infections (ALRI), diarrheal diseases, malaria, TB, HIV/AIDS, and other STIs.

The Gates Foundation awarded a grant to the Center for Human Services (CHS) in 2007 to research the potential demand for rapid diagnostic tests (RDTs) in five of these disease areas: ALRI, malaria, TB, HIV, and STIs. Research on the potential demand for diarrheal disease diagnostics was deferred pending further technical and clinical discussions. CHS is advancing the Gates Foundation’s vision of accelerating access to existing vaccines, drugs, and other disease-fighting tools to fight diseases that disproportionately affect developing countries, and is identifying new health technologies that will be effective, affordable, and practical in resource-poor settings of the developing world.
As one part of their research, CHS developed four Case Studies that examine past experiences with introducing new diagnostic technologies. These studies explore the factors that facilitated or hampered the uptake of new diagnostic tests in specific settings; and they offer insights that may smooth the way for future introduction of new diagnostics. The present Case Study, the last of this series, explores the current status of and potential for private-sector STI diagnostic services in India. Previous case studies dealt with:

- Discussions about adopting rapid syphilis tests in Tanzania
- Development and introduction of microscopic drug susceptibility testing to diagnose TB and to test for multi-drug-resistant TB in Peru
- Introduction of malaria RDTs at the community level in the Peruvian Amazon.

CHS also conducted research evaluating the potential demand for new diagnostic tests and identifying factors that might affect that demand among consumers and within the public, private for-profit, and private non-profit health sectors. Research objectives were to:

- Estimate consumer willingness to use and pay for new diagnostic tests
- Examine factors that influence consumer willingness to use and pay for tests
- Examine the extent to which health-care providers and program managers regard diagnostic tests for the selected illnesses as priorities in their countries.

The research included six willingness-to-pay reports, one for each diagnostic test studied:

- Screening pregnant women for syphilis as a routine part of antenatal care
- Testing for gonorrhea and chlamydia in high-risk asymptomatic populations
- Testing for HIV in children under 18 months of age
- Testing for active TB in HIV-positive and HIV-negative patients
- Testing for malaria in children under age five
- Testing for bacterial ALRI in children under age five.

The study examined syphilis separately from gonorrhea and chlamydia because the target population for syphilis screening (pregnant women) differs from that for gonorrhea and chlamydia (high risk asymptomatic populations such as commercial sex workers. The project covered four countries: Benin, India, Peru, and Tanzania. Each report provides country demographic and epidemiological profiles along with information on current standards of diagnosis.

Information for the study was obtained from health worker interviews, consumer surveys, and focus groups, as well as from the literature. The interviews provide data on the degree to which health professionals at different management and service-provider levels are satisfied with the current diagnostic standard or see the need for a newer technology. The surveys and focus groups yield perspectives on consumers’ willingness to pay, factors that influence willingness to pay, and consumers’ preferences about different types of diagnostic samples (e.g., blood, urine, sputum, etc.). The results for Benin, Peru, and Tanzania have been presented in the report for each diagnostic; CHS conducted additional research in India and is publishing those results in separate reports.
Copies of all reports are available for download from the CHS website: http://www.urc-chs.com/resources/resources-pubs.htm. For more information, please contact the Bill & Melinda Gates Foundation or visit its web site: http://www.gatesfoundation.org.
EXECUTIVE SUMMARY

Sexually transmitted infections (STIs) such as syphilis, gonorrhea, and chlamydia pose a significant health burden in India and globally. However, many STIs cause no symptoms and stigma-related barriers discourage people from seeking biomedical care. Opportune diagnosis and treatment are key to reducing STIs, but current practice in India makes this the exception rather than the rule. Laboratory tests for STIs are rarely accessible at the primary care level or in rural facilities, largely due to inadequate resources. Furthermore, the government-funded National AIDS Control Organization (NACO) only recently implemented a new STI policy that promotes syndromic case management and does not address asymptomatic or unreported infections.

India’s large private health sector constitutes a potential market for improved STI care. A Center for Human Services (CHS) team carried out interviews with private providers in different regions of India and a literature review to:

- Explore current private-sector approaches to diagnosing syphilis, chlamydia, and gonorrhea;
- Describe the different types of private providers and the clientele they serve;
- Analyze market opportunities and constraints affecting improved STI diagnosis within each market segment.

Results show the private sector handles the majority of outpatient care in India, including STI treatment. Private-sector providers include trained and untrained medical practitioners that represent allopathic and non-allopathic systems of medicine. They work in individual or small-group practices, small individually operated clinics and large corporate hospitals, pharmacies and chemist shops, diagnostic laboratories, and nongovernmental and faith-based organizations. Many private providers also work part time in the public sector. Private health services are largely unregulated.

In general, the private sector has more advanced diagnostic capacity than the public sector, particularly in urban-based hospitals and commercial laboratory networks. At the primary care level, however, lab-based diagnostic tests are rarely performed. The non-profit private sector, meanwhile, provides important links to rural, poor, and high-risk groups for STI/HIV screening services, but relies mainly on syndromic case management. Given the low cost of treatment and the relative ease of this approach, STI diagnostics are not considered cost-effective.

From a marketing perspective, national guidelines do not constrain providers, allowing them to freely choose and implement new STI diagnostic tests in their facilities. Providers value more accurate STI tests that are inexpensive and simple to use, requiring minimal reagents and personnel. Non-allopathic systems that are rooted in cultural and scientific traditions constitute an important market segment that rural and low-income patients frequently access. To increase demand for new STI diagnostics, strategic marketing and outside funding may be needed to target NGO services that serve high-risk patients and pregnant women.

Private health services can implement new STI diagnostics if targeted appropriately and backed by intensive marketing efforts. Potential private markets for STI diagnostics include for-profit
and non-profit hospitals, individual medical practitioners, laboratories, and non-governmental and faith-based organizations. Individual pharmacists do not currently represent a market segment for diagnostics. Providers are hesitant about over-the-counter tests as retail pharmacies lack privacy while pharmacists have very limited diagnostic experience and are unable to support patient management for STI care.

**Recommendations**
The following recommendations provide a basis for future marketing and research on STI diagnostics in India:

1. Design a marketing strategy for new STI diagnostics aimed at physicians and private laboratories to leverage the referral relationship.
2. Explore the possibility of marketing STI diagnostic tests to registered non-allopathic providers.
3. Market new STIs diagnostics that improve operational efficiencies and reduce costs at large hospitals.
4. Explore opportunities via public-private partnerships to subsidize new diagnostic tests for high-risk groups.
5. Do not target over-the-counter STI diagnostics at pharmacies and chemist shops.
Figure 1: The Indian states included in this case study: Andhra Pradesh, Rajasthan, and West Bengal
INTRODUCTION

Sexually transmitted infections (STIs) such as syphilis, gonorrhea and chlamydia pose a significant health burden in India and globally. India is thought to account for approximately 30 million of the estimated 340 million annual infections worldwide. However many STIs cause no symptoms, so population prevalence in India is unknown. Even symptomatic infections are probably underreported since stigma and other barriers discourage people from seeking biomedical care. In addition, donors, policy makers, health-care providers and consumers often consider STIs a low priority.

Beyond their immediate contribution to morbidity, STIs increase the risk of transmitting or becoming infected with the human immunodeficiency virus (HIV). This makes STIs a particular concern for high-risk groups such as commercial sex workers (CSWs) and men who have sex with men (MSM). Because of their many sexual partners, CSWs and MSM can act as a bridge population through which individual infections spiral into a generalized epidemic. Members of these groups are also more likely to have asymptomatic illness that remains undetected. In women of reproductive age, chlamydia, gonorrhea, and syphilis increase the risk of ectopic pregnancy, spontaneous abortion, preterm delivery, stillbirth, and sterility.

Opportune diagnosis and treatment are key to reducing STIs, but current practice makes this the exception rather than the rule. Indian national standards stipulate routine syphilis screening in pregnancy. However many pregnant women go unscreened due to inadequate public sector resources. Laboratory tests for chlamydia and gonorrhea are rarely available. The National AIDS Control Organization (NACO) recently introduced a scheme for syndromic case management of chlamydia and gonorrhea. This scheme is effective when patients present with symptoms, but does not address asymptomatic or unreported infections. Furthermore, though NACO is attempting outreach, CSWs, brothel owners, and MSMs are extremely wary of government contact. Given these obstacles, Indian authorities estimate that the primary patient and his or her sexual partners complete treatment in only 1% of cases.

India has a large diverse private health-care sector in which many STI patients seek treatment. This makes the prospect of improving STI diagnosis through the private sector intriguing. The current case study explores that prospect. It reviews current approaches to diagnosing chlamydia, gonorrhea, and syphilis, describes the different types of private providers and the clientele they serve, and then analyzes market opportunities and constraints for improved STI diagnosis within each market segment.

DATA COLLECTION METHODS

A Center for Human Services (CHS) team carried out interviews with individual providers and representatives from the Indian Medical Association, the Indian Pharmaceutical Association, and the Association of Non-governmental and Private Voluntary Organizations. CHS also carried out observations of providers where possible. A review of survey data, government and organizational reports, and appropriate literature complements this data. The appendix lists the people interviewed, institutional affiliations, and interview dates. Due to the sensitive nature of some comments, interviewees are not quoted by name.
The team conducted interviews in Andhra Pradesh, Rajasthan, West Bengal, and Delhi. Though not intended to be representative of the country as a whole, these sites represent a wide range of India’s different geographic and socioeconomic regions.

BACKGROUND

Epidemiology of STIs
An estimated 12 million people worldwide are infected with syphilis each year. In India, country prevalence data on syphilis in the general population is unavailable. However, several studies reveal regional and subpopulation differences. In the Mysore district of Karnataka in southern India for example, syphilis prevalence is estimated at 1.6% in rural areas and 1.3% in urban areas. Study results show that in urban areas, syphilis is twice as prevalent among men (2%) as women (1%).

In northern India, syphilis prevalence among pregnant women has decreased significantly from about 3% in 1996 to around 0.8% in 2005. This trend is attributed to increased awareness among pregnant women of the consequences of untreated syphilis, improved monitoring of STI management, and increased access to over-the-counter antibiotics. Studies on high-risk populations reveal a 6% prevalence in long-distance truckers and a 23% prevalence in commercial sex workers.

Worldwide, an estimated 92 million cases of chlamydia and 62 million cases of gonorrhea occur each year. As with syphilis, national prevalence data for chlamydia and gonorrhea in India are unavailable. The Indian government estimates STI prevalence to be 6%, with a total of 30 million people infected, many of them commercial sex workers and men who have sex with men. However, existing data are believed to substantially underestimate the number of STI cases because of social stigma and the asymptomatic nature of STIs.

STI Profiles
Caused by the spirochete Treponema pallidum, syphilis is transmitted through sexual contact or transplacentally to the fetus of an infected pregnant woman. If left untreated, syphilis can damage the heart and nervous system. Approximately 30% of affected pregnancies end in stillbirth. Thirty percent of infected mothers give birth to a child with congenital syphilis. Syphilis-caused genital sores are associated with a two- to five-fold increased risk of transmitting and acquiring HIV.

Chlamydia is caused by the bacterium Chlamydia trachomatis. Three quarters of infected women and half of infected men have no symptoms. Forty percent of women with untreated chlamydia develop pelvic inflammatory disease (PID). While complications in men are less common, sometimes the infection spreads to the epididymis resulting in pain, fever, and even sterility. Chlamydia during pregnancy can lead to premature delivery and/or spread to the eyes and respiratory tract of the newborn, causing pneumonia and/or conjunctivitis.

Caused by the bacterium Neisseria gonorrhoeae, gonorrhea can also be asymptomatic. In women, untreated gonorrhea can cause PID, infertility, and increased risk for ectopic pregnancies. In men, it can cause epididymitis. Gonorrhea passed from a mother to her newborn during delivery can cause blindness, joint infections, or a life-threatening blood infection.
Diagnostic tools for STIs

Syndromic case management (SCM)

The World Health Organization (WHO) endorses syndromic case management (SCM) of STIs for patients without access to laboratory services. The basic approach treats and diagnoses patients for all probable causes of clinical observations. Syndromic case management is inexpensive and accessible. No laboratory equipment is required and different levels of service providers can easily implement it. However, there are several disadvantages. The approach cannot identify infection in asymptomatic clients. In addition, overtreatment associated with SCM can potentially lead to antibiotic resistance.

Syphilis Tests

There are two basic types of serological tests for syphilis: treponemal and non-treponemal. Treponemal tests detect the presence of an antigen or antibody specific to *T. pallidum*. These tests can distinguish syphilis from other infections, but they cannot distinguish between an active and past infection. This is because the antigens or antibodies to which the tests react remain in the bloodstream for years after an infection is treated. In contrast, non-treponemal tests do not detect antibodies against *T. pallidum*, but detect the presence of reagin, a non-specific antibody that reacts with substances released when cells are being damaged; false positives can result from infections or conditions other than syphilis.\(^{12}\)

In ideal circumstances, a patient thought to have syphilis is first screened using a non-treponemal diagnostic like a rapid plasma reagin (RPR) or Venereal Disease Research Laboratory (VDRL) test. The VDRL test resembles RPR, but requires a microscope to interpret the results. RPR is typically used for screening in smaller facilities; VDRL is used for larger patient volumes. Although these tests indicate the presence of *active* infections, a treponemal test must then be used to confirm that the infection is due to syphilis. If used alone, non-treponemal tests can result in false positives among patients with certain types of non-syphilitic infections and can result in overtreatment. However, in settings where scarce resources preclude two-stage testing, overtreatment is less dangerous than leaving infected patients untreated.\(^{13}\)

Over 20 different point-of-care (POC) rapid tests for syphilis are now available on the world market.\(^{14}\) These tests have several advantages over diagnostics like RPR or VDRL. First, they are self-contained units requiring no additional equipment. Second, they do not require refrigeration. Third, while RPR results are open to subjective interpretation, rapid tests are simpler to interpret and require less training of health workers. Many POC tests rely on finger stick whole blood samples, eliminating the need for a venous blood draw and time-consuming serum separation. They provide results in about 15 minutes, enabling immediate treatment. A major disadvantage is that, like other treponemal tests, they do not distinguish between current and past infection.

Chlamydia and Gonorrhea Tests

Several types of diagnostic tests can detect gonorrhea and chlamydia. The technical and infrastructural demands of these tests present significant obstacles to their use in resource-limited settings where laboratories often lack equipment and trained staff.
The Nucleic Acid Amplification Tests (NAAT), such as polymerase chain reaction (PCR) and transcription mediated amplification (TMA) detect and make copies of the bacterial DNA in body fluid specimens. DNA probe tests also detect bacterial DNA, but are not as sensitive as the NAAT tests. Enzyme linked immunosorbent assay (ELISA) tests detect bacterial antigens. Cultures of samples from infected areas and bacterial growth substances can also detect infection and, unlike other tests, can test for antibiotic resistance. Gram stains using microscope slides of sample fluids from infected areas produce faster results, but are less reliable than molecular probe or culture tests. A Gram stain of the discharge is both sensitive and specific for men. For women, smear tests are less effective and detect approximately 50% of infections. Tests are not recommended for routine use with female patients.

Rapid POC tests are commercially available. POC tests for chlamydia have a sensitivity of 55–85% in high-prevalence populations and 25–49% in low-prevalence populations. For gonorrhea, the endocervical Gram stains and urethral smears have a sensitivity of 37–70%. Despite their low sensitivity, POC tests can be important tools for STI control, particularly in settings where patient loss to follow-up is a concern. Although less sensitive and specific than other laboratory tests, they provide more accurate diagnosis than the syndromic approach.

**Current national approaches to STI care and treatment**

The Indian National AIDS Control Organization (NACO) directs government-funded STI care and treatment strategies. It was established in 2007, following an explosion of HIV infections. Its five-year budget of 70 billion rupees (about US$1.45 billion at the time of the study) is more than triple the 20.6 billion rupees allotted during the preceding five years. Syndromic case management and presumptive treatment are widely used to treat STIs. Presumptive treatment of unconfirmed infection in high-risk individuals is based on the assumption that infection is likely. Treatment is sometimes provided at regular intervals. The program is expanding reach to high-risk groups through partnerships with private providers. National policy recommends several STI laboratory diagnostic strategies, where available.

**Syphilis Tests in India**

Syphilis screening is mandatory for pregnant women in India as part of antenatal care. Regular syphilis screening is also promoted for high-risk groups. National guidelines recommend using non-treponemal RPR or VDRL tests for screening. For confirmation, national guidelines recommend several treponemal tests (e.g., Fluorescent Treponemal Antibody–absorption, *Treponema pallidum* haemagglutination test) where available. Confirmatory tests, however, are rarely performed because they are nearly three times more expensive than RPR and require more advanced laboratory skills.

Testing is free in the public sector, but serologic tests are often unavailable in peripheral health facilities.

**Chlamydia and Gonorrhea Tests in India**

National STI guidelines recommend a Gram stain or ELISA test for gonorrhea where laboratory facilities allow. Gram stains take about 10 minutes and results are available to the client in 1–2 days in a high-performing lab. Lab tests for gonorrhea, however, are rarely performed at the
primary care level in public and private sectors. No serologic test is available for chlamydia in India.

**Private-Sector Providers of STI Diagnostics**

There are approximately 790 million users of private-sector services in India, compared to the public sector’s 290 million users. The private sector handles the majority of outpatient care in India, including STI treatment. A common perception is that the private sector provides higher quality care than the public sector. An estimated 80% of patients with STIs prefer to use the private sector.

Private-sector providers include trained and untrained medical practitioners. They work in individual or small-group practices, small individually operated clinics and large corporate hospitals, large pharmacies and smaller chemist shops, diagnostic laboratories, and nongovernmental and faith-based organizations (see Table 1). Many private providers also work in the public sector.

The formal private sector is comprised of registered allopathic and non-allopathic practitioners (described below). The informal sector consists of untrained private providers known as registered medical practitioners (RMPs). In rural areas, most patients seek care from qualified non-allopathic providers and RMPs. These services are of variable quality. Practices are largely unregulated and adherence to national standards is not monitored.

Non-allopathic medicine (sometimes referred to as alternative medicine) constitutes an important source of health care in India. Approximately 70–80% of Indians seek care from providers practicing different systems such as Ayurveda, Siddha, Unani, and homeopathy. With the exception of homeopathy, these systems are rooted in Indian empirical and cultural traditions that date back thousands of years. Ayurveda is the most commonly practiced non-allopathic medicine, particularly in rural areas. Nearly every major city has an Ayurvedic college and hospital.

Consumers tend to shop around among different types of providers. For rural patients, a typical care-seeking pattern might entail: i) trying a home remedy; ii) seeing a private unqualified provider (RMP); iii) seeing a qualified nurse; and iv) traveling to the city for treatment by a private doctor. These patients often travel considerable distances to reach a qualified private provider when previous treatments fail. For STI treatment, this may entail multiple trips and referrals to different testing services for appropriate care.

**For-profit providers**

**Private Hospitals and Clinics**

In-patient departments at most large hospitals in India encounter relatively few STIs. However, several private and corporate hospital chains have top-of-the-line diagnostic facilities. These hospitals conduct a large volume of diagnostic testing, often as a central service to clinics in networks.
Table 1: Overview of private-sector providers of STI diagnostic services\textsuperscript{11,27}

<table>
<thead>
<tr>
<th>Private-sector providers</th>
<th>Organizational size and structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For-profit:</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Private hospitals/clinics| ~20,000 hospitals (67% of the 30,000 hospitals in India)  
Dermatology departments in academia and clinics |
| Individual private medical practitioners | ~10 million:  
• 390,000 registered qualified allopathic physicians  
• 650,000 registered non-allopathic providers of other systems of medicine (e.g., Ayurveda, Unani, homeopathic)  
• Registered medical practitioners (RMPs) |
| Large pharmacies | 850 pharmacy colleges  
10,000-member Indian Pharmaceutical Association |
| Small pharmacies/chemists | 600,000 retail shops |
| Private laboratory services | E.g., one private lab franchise that serves 6 million people nationwide has 40 private labs and 1,000 sample-collection centers |
| **Non-profit:**          |                                  |
| Faith-based sector | e.g., Catholic Health Association of India (CHAI): 5,500 health-care facilities, 80% primary care, 6 medical colleges; 150 nursing schools and training programs  
e.g., Christian Medical Association of India (CMAI): 4 medical colleges; 327 mission hospitals; health centers and community health programs  
Other regional faith-based health networks |
| NGO sector | e.g., Avahan initiative: prevention services to ~5 million men at risk; ~200,000 CSWs, 60,000 high-risk MSM, and 20,000 IDUs; supports 412 clinics nationwide  
Public-private partnerships NACO+CBO or NGO |

One example is the Apollo Network, the largest hospital group in Asia, with over 9,000 beds in 45 hospitals across Asia and Africa. It is also the first corporate hospital-supported pharmacy chain, with over 800 retail outlets of Apollo-branded pharmacies throughout India. In India, Apollo employs over 1,000 doctors. About 70% these doctors received training in the U.S. or U.K.\textsuperscript{28} Apollo provides central laboratory support services and transports samples to all its Indian facilities.
Another private network, Fortis, has 58 hospitals nationwide. It serves primarily middle-class and wealthy patients. Fortis contracts all its diagnostic work to India’s largest private lab network, SLR.

The Gates-funded Avahan Initiative has an extensive private-sector clinic network. Avahan operates in the six Indian states with highest HIV prevalence: Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Nagaland, and Manipur. The National AIDS Control Organization’s strategy is modeled after Avahan’s approach to diagnostics. Services are considered user-friendly and stigma-free to attract high-risk groups. Avahan supports 412 STI clinics that target sex workers, paying for clinic space, supplies, and salaries of a physician, nurse, and counselor. In areas with fewer commercial sex workers, Avahan uses mobile clinics and pays for regularly scheduled physician visits. Avahan strengthened 736 fee-for-service STI clinics for high-risk men in “hotspots” where sexual solicitation takes place. The clinics sell prepackaged SCM treatment kits (antibiotics, condoms, instructions, and partner referral cards) at clinics and chemist shops in the area. The project also supports similar, branded clinics that provide free consultations at truck stops. Some Avahan clinics refer clients for diagnostic services; others offer on-site syphilis screening.

Private Practitioners in Individual or Small-group Practice

India has approximately 10 million private medical practitioners. Data from 1999 estimates there are 390,000 qualified allopathic physicians registered with Indian medical councils and 650,000 providers with other non-allopathic systems (mostly homeopathic and ayurvedic). There are 241 colleges in India offering government-accredited medical degrees in these different disciplines.

Registered medical practitioners (RMPs) make up the third provider group. RMPs generally have no training but are rural patients’ first choice. An individual from Jaipur explained, “They give you the whole package – diagnosis, prescription, and treatment.” People prefer RMPs because “they don’t treat them like patients. They treat them like human beings.”

Allopathic doctors typically work in public practice as well as public or private hospitals. According to interviewees, the government encourages qualified non-allopathic providers to do laboratory testing to attract clients who normally distrust the public system. Ayurvedic, Unani, and homeopathic physicians can also write prescriptions for STI treatment.

A 2002 study in Karnataka assessed private provider readiness to provide STI and HIV services. According to the study, none of the provider groups described above perceived their treating of STI patients to have a role in HIV prevention. However, allopathic doctors did refer STI patients more frequently for HIV testing than did the other two groups. Few non-allopathic practitioners receive HIV/STI training. However, the study found that 46% of allopaths, 51% of qualified non-allopaths, and 67% of RMPs were willing to pay for such training.

There is often a relationship between physicians and commercial diagnostics labs. Many providers receive a commission from labs based on patient referrals. Some physicians refuse to accept results from labs not part of this relationship. Private physicians may also refer patients to a particular pharmacy to fill prescriptions – and may receive a commission on pharmacy sales.
NACO recently initiated a peripheral provider program to expand access to STI and HIV services. The program trained 8,000 private providers in syndromic case management. Additionally, NACO distributes free medicines and pays private providers about 50 rupees (about US$1) to treat STI patients.

**Pharmacies and Chemist Shops**

India’s pharmacy sector is large and diverse. According to the Pharmacy Council of India, there were 559,408 registered pharmacists in India in June 2003. Smaller kiosks, chemist shops, and full-scale pharmacies make up an estimated 550,000 retail shops. However, concentration is skewed. The largest concentration of pharmacies is found in urban areas. These shops are often crowded and lack patient privacy. Patients in rural villages may lack access to a pharmacy and may have to travel long distances to reach one. The Indian pharmacy sector is unregulated and service quality varies. Staff training ranges from no pharmacy education to a doctorate-level qualification. A large majority of shops are owned and managed by non-pharmacists. At the community level, pharmacists are oriented towards dispensing medicines rather than patient care. Additionally, as previously mentioned, it is a common practice for providers in alternative medicine systems to prescribe allopathic medicines.

The current market for diagnostics in pharmacies is weak. Pharmacists generally do not work with diagnostics, as patients are referred to laboratory centers. Additionally, pharmacists lack training in this field. Within the past 4–5 years, however, pregnancy and blood glucose tests have slowly become available in private pharmacies.

**Private Laboratory Services**

The primary users of laboratory instruments, reagents, and supplies are medical laboratories and hospitals. Smaller and more rural facilities in both private and public sectors have limited laboratory diagnostic services on-site. Most people – including high-risk groups and rural populations – use private diagnostic facilities periodically, usually on the recommendation of their service provider. There are very few self-referrals to either diagnostic centers or
pharmacies. As previously mentioned, physicians typically use services from a preferred lab in return for a commission and may not accept results from a different facility.

Each state in India establishes its own product procurement system for public labs, while private hospitals and laboratories obtain products through multiple sources. Commercial laboratories tend to have the most up-to-date instruments and offer varied diagnostic services at competitive prices. These laboratories stock products based on test preferences of referring physicians; estimated demand for tests; and an assessment of the instrumentation, personnel, and other costs associated with the test.

**Non-profit providers**

The non-profit sector consists of an extensive community and faith-based network that attempts to link high-risk groups to stigma-free health-care facilities. Many high-risk populations prefer the private sector where “they feel at home within their own system,” said one interviewee from Hyderabad. Sector approaches are innovative and designed to empower high-risk individuals to access services regularly. Patients are referred by fellow sex workers or friends who know whether the doctors are “community friendly,” whether they will examine MSMs and whether there are concerns about law enforcement. As mentioned previously, NACO recently expanded partnerships with the non-profit sector to better serve high-risk groups. Non-profit clients are linked to government-funded antiretroviral therapy centers, and community care and education programs. A small selection of faith-based and NGO programs are profiled below.

**Faith-based Sector**

The faith-based sector makes up a large proportion of formal health care in India. The two largest networks are the Catholic Health Association of India (CHAI) and the Christian Medical Association of India (CMAI). CHAI provides an estimated 25–30% of all health-care services, although Catholics comprise less than 2% of the population. There are 5500 different health-care facilities in the CHAI network. A majority (80%) operate at the primary care level in remote and rural communities. CHAI also oversees six medical colleges and 150 nursing schools and training programs. In addition, the CMAI network has four medical colleges, more than 327 mission hospitals, and several health centers and community health programs. Other important faith-based networks cover specific geographic areas – for example, the Emanuel Health Association, with a network of 20 member hospitals and community-based programs in north and northeast India.

Faith-based health-care providers offer important support to national health goals, including technical assistance. They often partner with government and share staff, supplies, and medicines. Faith-based services play a key role in reaching poor, remote, unreached, and socially marginalized populations. The government utilizes these networks for outreach activities.

**NGO Sector**

The previously described Avahan Initiative is the most influential NGO-sector program working on STIs and HIV in India. Avahan serves approximately 5 million men at risk, including long-distance truckers and men at sex-solicitation locales. Avahan’s services are available to nearly 200,000 CSWs, 60,000 high-risk MSM, and 20,000 injecting drug users (IDUs), providing HIV
prevention services such as condoms, counseling, and treatment for STIs. Additionally, Avahan’s seven implementing partners, made up of large national and international organizations, fund and support 134 grassroots NGOs. The program has 120 different interventions in Andhra Pradesh alone. Avahan considers factors beyond service provision, emphasizing community mobilization and factors that contribute to HIV and STIs. Avahan’s five-year plan to transfer control of its program to the government is experiencing challenges. In one instance, the government reduced funding of a community-based organization (CBO) previously supported by Avahan. The CBO cut its six-hour day of services to three hours, and recruited community volunteers to clean the facility to make up for the funding shortfall.

The All India Institute of Hygiene and Public Health launched the model Sonagachi Project in 1992. This began as a small health-promotion project to inform sex workers in Kolkata (Calcutta) about AIDS and to promote condom use and STI testing. It evolved into a multifaceted community effort to empower sex workers (particularly women). The program includes peer education, condom social marketing, reproductive health care, community organizing, rights-based activism, education and training programs, and anti-trafficking initiatives. HIV prevalence remains below 10%, and rates of condom use have risen to 90% among Kolkata sex workers. In other Indian cities, the trend is reversed. The project is a collaborative effort of governmental, nongovernmental, and community-based organizations, working in over 40 areas throughout West Bengal to meet the needs of 60,000 male, female, and transgender sex workers based in brothels, on the streets, and in hotels.31

Current Approaches of Private-Sector Providers to STI Diagnostics

STI diagnosis is the private and public sector is primarily microscopy-based. As in the public sector, non-treponemal and treponemal lab-based tests are used for syphilis diagnosis. In addition, some facilities use rapid diagnostic tests. However, rapid tests are less available in rural areas. Conversely, no rapid tests are currently used for gonorrhea and chlamydia, according to interviewees. As with the public sector, a Gram stain is used to test for gonorrhea. However, lab tests for gonorrhea are rarely performed at the primary care level in public and private sectors. There is no good test available for chlamydia.

Although employment or insurance schemes may cover the cost of tests, most private sector patients pay out of pocket. Test costs are particularly burdensome for rural patients. Added costs include travel expenses and missed work to reach testing and diagnostic facilities that may be 40–50 km apart. Navigating the vertical STI/HIV treatment and referral system may require even more travel. For example, a patient may come in twice for STI diagnosis and treatment, be referred to a separate HIV integrated counseling and treatment center (ICTC) for an HIV test and, if positive, referred to additional facilities for antiretroviral therapy services or tuberculosis testing.

Despite diagnostic test capacity, most private sector facilities choose syndromic management to address STIs. Given the low cost of drugs and the relative ease of syndromic management, lab tests are generally not considered cost effective for STI management. According to one doctor in Hyderabad, the private sector is not diagnosing gonorrhea and chlamydia with lab tests, but
treating symptoms. At the same time, patients are more concerned with treatment than with diagnosis because of the low costs.

Current rapid diagnostic tests that require lab processing are subject to the same delays as other lab tests. Patients will still have to wait or return for the lab referral, testing, and return of results. Rapid POC tests should be explored as diagnostics for gonorrhea or chlamydia to improve individual diagnosis where lab facilities are unavailable. Characteristics of ideal STI rapid tests are listed in Table 2.

**Table 2: Characteristics of Ideal STI Rapid Tests According to Respondents**

<table>
<thead>
<tr>
<th>Inexpensive</th>
<th>Requires minimal blood and no cold storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitive and specific</td>
<td>Long shelf life</td>
</tr>
<tr>
<td>Rapid and reliable</td>
<td>Not dependent on efficiency of health system</td>
</tr>
<tr>
<td>Simple, requiring minimal technical expertise and instrumentation</td>
<td></td>
</tr>
</tbody>
</table>

**Potential Markets for STI Diagnostics among Private-Sector Providers**

**For-profit sector**

**Private Hospitals and Clinics**

All providers consider large private hospitals and network laboratories to be important potential markets for STI diagnostic tests. These network systems have the capacity to implement new STI diagnostics, however they see few STI patients. New diagnostic tests that improve operational efficiencies at these large facilities could be attractive: One example would be a rapid POC test that does not require lab processing.

In a study calculating the economic cost per patient of STI treatment in 14 public, hospital-based STI clinics in Andhra Pradesh using 2003–2004 cost and output data, researchers found that the average cost per STI treated for all 14 clinics was 729.5 rupees (approximately US$ 15.13 at the time of the study). Analysis indicated that substantially more STI cases could be optimally handled at eight of the 14 clinics by increasing demand.

**Individual or Small-group Practice**

These practices generally have too little volume to buy tests wholesale and use them before they expire. Yet, private providers have more options than public providers in terms of diagnostics, have access to better diagnostic facilities, and are not encumbered by national guidelines. In general, their clients have higher socioeconomic status and can better afford a test.

Nevertheless, private medical practitioners are the gatekeepers of the diagnostic system, typically deciding the type of test and the lab their patients should use following a clinical examination.

**Pharmacies and Chemist Shops**

Nearly all interviewees reported that there is little experience purchasing diagnostic tests over the counter in India. Despite recent precedents of diagnostics (i.e., pregnancy and blood glucose
tests) sold in pharmacies, market potential in this sector is considered weak. Most pharmacies lack the sales volume necessary for wholesale purchases and timely product movement. In addition, pharmacists, public- and private-sector physicians, and program managers agree that diagnostics should be directly linked to health-care providers to ensure adequate patient education, treatment, and follow-up. They also feel that asymptomatic patients – particularly CSWs and MSM – would be unlikely to pay for diagnostics. Screening asymptomatic clients and providing adequate education and follow-up would be better achieved with POC testing or referral links between health-care providers and diagnostic centers.

Although Indian pharmacies are often considered service points that offer greater anonymity, privacy, and discretion, in reality, they can be crowded and offer less privacy than a health-care facility. Thus, while not impossible, promoting over-the-counter self-diagnosis via pharmacies would require an intensive and creative marketing effort to overcome the considerable cultural barriers.

**Private Laboratories**

Like laboratories at large hospitals and clinics, larger commercial labs collect samples from multiple locations and process them centrally. Rapid diagnostic tests requiring laboratory processing may still take hours, if not day(s), using the current processing system. However, larger labs or networks may generate enough patient volume to use tests in a timely way and make a profit for the lab.

Nearly all interviewees considered private laboratories a prime market for rapid diagnostic tests if marketing is directed to private medical practitioners who often control the choice of test and referrals to specific labs. Private laboratories prefer tests requiring minimal use of reagents, personnel, supplies, and instrumentation. Key criteria for tests include maximizing profits, minimizing consumer costs, and streamlining test processing. POC rapid tests may be suitable options.

**Non-profit sector**

The non-profit sector plays a key role in linking rural, poor, and high-risk groups to STI/HIV screening services. Still, the NGO sector may need to expend considerable effort to generate demand among high-risk groups for RDTs – or for any testing services. Given the nature of their outreach services to remote and marginalized populations, respondents in the non-profit sector say their priorities for STI diagnostics are simple tools that can be used by workers with limited technical and literacy skills and without lab support. Non-profit facilities that provide comprehensive health services consider STI diagnostics a lower priority in rural and remote areas than basic programs for hygiene and health care.

Diagnostic tests that are subsidized through public-private partnerships might be an option. Interviewees suggested that a rapid diagnostic test that reduced the need for an internal exam could encourage women to come for regular screening.
<table>
<thead>
<tr>
<th>Private-sector</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For-profit:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private hospitals/clinics</td>
<td>Hospital-related; part of clinic network; RDTs processed in clinic area save time; adequate volume to buy and use tests, making a profit.</td>
<td>RDTs do not save time if processed in microscopy-based diagnostic system.</td>
</tr>
<tr>
<td>Individual private medical practitioners (allopathic and non-allopathic*)</td>
<td>More diagnostic options and better facilities than public providers; fewer national guidelines; Wealthy clients; practitioners decide which tests and labs their patients use. *Non-allopathic services serve a large number of rural patients and have cultural legitimacy.</td>
<td>Too little client volume to buy tests wholesale and use before expiration *Non-allopathic providers lack STI training.</td>
</tr>
<tr>
<td>Large pharmacies</td>
<td>Highly accessible</td>
<td>Few precedents for over-the-counter diagnostics; low sales volume; Lack privacy and anonymity.</td>
</tr>
<tr>
<td>Small pharmacies/chemists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private laboratory services</td>
<td>Larger labs or networks have enough patient volume to use tests quickly and make a profit; can be a prime market if jointly marketed to private practitioners.</td>
<td>RDTs do not save time if using current processing system.</td>
</tr>
<tr>
<td><strong>Non-profit:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faith-based sector</td>
<td>Non-profits link rural, poor, and high-risk groups to screening services for HIV and other STIs; priority on simple tools; public-private partnerships could also link high-risk groups to STI testing services; subsidized (free) RDTs that reduce need for internal exams would encourage regular screening in women.</td>
<td>Work is required to generate demand for RDTs in HRGs; sector regards STI diagnostics as lower priority than other services in rural and remote areas.</td>
</tr>
<tr>
<td>NGO sector</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSIONS AND RECOMMENDATIONS

Conclusions
India’s vast private health sector is made up of diverse services that are largely unregulated. In the words of a provider from Delhi: “This country is 20 countries in one country!”

Heterogeneity, combined with the lack of representative data, renders generalizations a challenge. The limited data available come from tertiary facilities and other higher-level institutions. Community-based care and treatment programs with high-risk groups and public-private partnerships offer potentially useful and more recent images of the situation in the country. These snapshots must be developed if we are to improve our understanding of India’s complex health sector.

Research from this case study highlights opportunities and challenges to improving STI diagnosis in the private sector. The private sector is more accessible because it supplies the majority of care and is preferred by STI patients. National guidelines do not constrain providers, but allow them to freely choose and implement new diagnostic tests in their facilities. In addition, the non-profit private sector is made up of extensive networks that link rural, poor, and high-risk groups to STI/HIV screening services. Many public sector programs are now modeled after key community-based programs, such as the Gates-funded Avahan Initiative. Likewise, the government is investing in public-private partnerships to better serve marginalized groups.

Current STI diagnostic approaches vary geographically and by disease. In general, the private sector has more advanced diagnostic capacity than the public sector, particularly in urban-based hospitals and commercial laboratory networks. Diagnostic centers receive a higher number of requests for syphilis tests than for other STI testing. Rapid diagnostic tests are used in the private sector, but are subject to the same processing schedule as other tests and do not necessarily save time. At the primary care level, however, lab-based diagnostic tests are rarely performed. Traveling long distances over several days to reach testing and diagnostic facilities is not uncommon for rural patients. As a result, many patients are lost to follow-up.

Cost is a critical factor for determining market potential. Targeting services that generate sufficient volume and turn a profit is one option. Likewise, new diagnostics that reduce costs through improved efficiencies associated with their design may be attractive to providers. Indian health providers indicated a need for rapid POC diagnostics for each STI to overcome challenges facing rural areas and improve treatment. Providers value new STI tests that are inexpensive and simple to use, requiring minimal reagents and personnel. Any new strategy will require significant marketing to generate sufficient consumer demand.

From a policy perspective, changing the national strategy of syndromic case management, though difficult in the short term, is necessary in the long term to improve diagnosis. Interviews with private- and public-sector providers suggest that syndromic case management should be regarded as an interim approach while health worker and lab capacities develop, particularly in rural areas. One physician summarized this point:

“Although gonorrhea and chlamydia don’t cause death, the numbers of infected persons in India alone are huge. Many of these cases are asymptomatic, but they [STI cases] cause a lot of
morbidity and make people more vulnerable to HIV infection, which is potentially fatal. … In terms of needing rapid tests for a disease, we really need one for gonorrhea and chlamydia to complement syndromic management. … If the test was simple and rapid, it would help physicians zero in on the etiologic agents and treat patients accordingly, rather than over-treating because it’s less risky than under-treating.”

**Recommendations**

Private health services can implement new STI diagnostics if targeted appropriately and backed by intensive marketing efforts. Potential private markets for STI diagnostics include for-profit and non-profit hospitals, individual medical practitioners, laboratories, NGOs and FBOs. The following recommendations provide a base for future marketing and research on STI diagnostics in India.

1. **Design a marketing strategy for new STI diagnostics aimed at physicians and private laboratories to leverage the referral relationship.**

   National guidelines do not constrain private providers, but allow them to freely choose diagnostic tests according to their preferences. Private physicians, in turn, control referrals to diagnostic centers and private laboratories. Large labs can generate enough patient volume to use tests in a timely way and make a profit.

2. **Explore marketing STI diagnostic tests to registered non-allopathic providers.**

   Many Indians receive care from private providers practicing alternative health systems such as Ayurveda and Unani. Patients prefer non-allopathic providers based on cultural traditions and beliefs. These systems are also more accessible, particularly for rural low-income patients.

3. **Market new STIs diagnostics that improve operational efficiencies and reduce costs at large hospitals.**

   Large private hospitals can afford new tests, but see few STI patients. These facilities are motivated by their bottom line. Diagnostic tests that reduce operating costs may incentivize hospitals to strengthen current approaches. Improved tools, combined with social marketing in urban areas, may encourage individuals from the general population to seek STI services.

4. **Explore opportunities to subsidize new diagnostic tests for high-risk groups via public-private partnerships.**

   The non-profit sector provides the greatest access to high-risk populations and is an important market for improved diagnostics. At the primary care level, however, lab-based diagnostic tests are rarely performed. Given the low cost of treatment and the relative ease of syndromic case management, diagnostic tests are not considered cost-effective. Simple diagnostic tools combined with strategic marketing are needed to increase demand for STI services. New diagnostic tests may require subsidies to generate demand among low-income clients.

5. **Do not target over-the-counter STI diagnostics at pharmacies and chemist shops.**

   Providers are hesitant about over-the-counter tests because pharmacies are inexperienced with diagnostics, lack privacy, and are unable to support patient management for STI care. Many
pharmacies lack the sales volume for wholesale purchase and timely product movement. Also, asymptomatic patients lack incentives to pay for new diagnostics. POC testing by a medical practitioner with referral links for education and follow-up is a better screening option.
REFERENCES


APPENDIX: INTERVIEWS THAT CONTRIBUTED TO THIS CASE STUDY

Dr. Vijay Ardulas, Chief Executive Officer, Christian Medical Association of India (CMAI), New Delhi

Professor Abraham, Professor of Community Health, CMAI, New Delhi

Dr. Fr. Mathew Abraham Puthenchirayil, Executive Secretary, Catholic Bishops’ Conference of India, Commission for Health, New Delhi

Barun Kanjilal, PhD, Professor Health Economics, Indian Institute of Health Management Research, Jaipur

Dr. Anjara Das, Family Health International, New Delhi

Dr. JVD Prasad, STI Specialist, APSACS/Hyderabad

Dr. JC Reddy, Joint Director, Basic Services Division, APSACS/Hyderabad

T. Kailash Ditya, Joint Director of Targeted Interventions, APSACS/Hyderabad

Dr. JK Kabra, Director & Consultant Physician, Camberwell Diagnostic & Medical Research Center, Jaipur

Dr. Dinesh Mathur, Professor & Head, Department of Skin, Leprosy, STD, and AIDS, Charak Bhawan, S.M.S. Hospital, Jaipur

Dr. P. Prabhakar, FHI/Andhra Pradesh, Hyderabad

Dr. Ch. Vijay Kumar, FHI/Andhra Pradesh, Hyderabad

Matangi Jayaram, Project Coordinator, Avahan, Hyderabad

Dr. Aman Kumar Singh, Technical Expert, National Technical Support Unit of the National AIDS Control Program (NACO), New Delhi

Dr. Kajal Krishna Banik, Obstetrician/gynecologist, Editor of the Journal of the Indian Medical Association, Kolkata

Dr. Ajay Khera, Joint Director and Health of Basic Services, National Technical Support Unit of the National AIDS Control Program (NACO), New Delhi