

# **Community Based Mobile Screening Programme for Oral, Breast and Cervical Cancers: A Programmatic Insight from rural Assam, India**

Article by Subrata Chanda<sup>1</sup>, Vishal Dogra<sup>2</sup>, Srabana Misra Bhagabaty<sup>3</sup>, Devesh Varma<sup>4</sup>, Amal Chandra Kataki<sup>5</sup>, Shailendra Hegde<sup>6</sup> <sup>1</sup>Clinical Domain, Piramal Swasthya Management and Research Institute, Guwahati, Assam, India <sup>2</sup>Department of Research & Analysis, Piramal Swasthya Management and Research Institute, Hyderabad, Telangana, India <sup>3</sup>Department of Preventive Oncology, Dr Bhubaneshwar Borooah Cancer Institute, Guwahati, Assam, India <sup>4</sup>Department of Information Technology, Piramal Swasthya Management and Research Institute, Hyderabad, Telangana, India <sup>5</sup>Director, Dr Bhubaneshwar Borooah Cancer Institute, Guwahati, Assam, India <sup>6</sup>Clinical Domain, Piramal Swasthya Management and Research Institute, Hyderabad, Telangana, India

E-mail: drsub05@yahoo.co.in

#### Abstract

The Kamrup district in Indian state of Assam has highest cancer incidence. The population, particularly in rural area has no access and resources for early cancer screening and care services. To fill this service gap, a not-for profit organization (Piramal Swasthya Management and Research Institute-PSMRI) in collaboration with semi-government institute (Dr. Bhubaneshwar Borooah Cancer Institute, Guwahati-BBCI) launched an innovative programme known as DESH (Detect Early, Save Her & Him) in rural Kamrup. The programme aims to reduce the proportion of late-stage diagnosis and mortality from oral, breast and cervical cancers through community-based awareness, screening and referral program.

During first year of program operations (November 2017 to June 2018), DESH screened 3937 beneficiaries across 96 villages in three blocks of rural Kamrup district. Out of the total screened population, 157 (4.0%) are initial screen positive (Oral 142; breast 7; cervix 8.) Out of all screen positives, only 62 visited the BBCI for further diagnosis and confirmation. Among screen positives, 4 beneficiaries are confirmed oral cancer cases (all male, 3 in stage 1; 1 in stage 3).

Ensuring continuous availability of doctors, greater public engagement and building community awareness of common cancers are some of the identified areas for improvement. In the long run, we see our program as an opportunity to build an evidence-based, cost-effective and replicable model for early detection of Oral, Breast and Cervical Cancers in resource-scarce settings.

**Keywords:** Community, DESH, Oral, Breast and Cervical Cancer, Mammography, Mobile Cancer Screening.

# Introduction

Cancer is one of the leading causes of mortality and morbidity in both developed and developing countries[1]. In India, cancer causes 0.3 million deaths annually and seven out of ten people diagnosed with cancers die within 5 years. The five-year survival rates for cancer detected in early stages (0, 1) are more than 90% for breast cancer and 83% for oral cancer [2,3]. In a community based randomized controlled study from India, reported that stage I & II oral cancer detection and three-year survival rates were 72% & 85% among intervention (screened) group compared to 13% & 44% respectively in the control group [4]. With regard to cervical cancer, the five-year survival rate is 64% if detected in stage I against 6% if detected in stage IV [5]. Similarly, another study from South India documented good survival among stage I cervical cancer cases detected through screening [6]. Moreover, it has been

# **DOI:** 10.21522/TIJPH.2013.07.01.Art009 **ISSN:** 2520-3134



estimated that investment of \$11.4 billion in prevention strategies, such as screening, in less wealthy countries can save up to \$100 billion in future costs of cancer treatments[7].

Therefore, cancer screening, in particular, the community based, is highly cost-effective, helpful in early detection, initiating timely treatment and achieving a complete cure [8]. However, cancer screening in India adopts a camp-based approach. Majority of such screening programs focus on either oral or breast cancer or cervix/ uteri or a combination thereof and largely restricted to urban or semi-urban geographies[9–11]. None of the existing community-based screening programs provides screening of the oral, breast and cervix/uteri cancers at a single service point for rural communities.

Piramal Swasthya Management and Research Institute(PSMRI), a Hyderabad based nongovernmental and not-for-profit organization in collaboration with Dr. B Borooah Cancer Institute (BBCI) launched a community-based mobile cancer-screening programme in one of the high cancer burden Indian state of Assam. The programme, known as DESH (Detect Early, Save Her & Him) aims to reduce the proportion of late-stage diagnosis and mortality from oral, breast and cervical cancers through awareness generation, screening and referral program.

In this paper, we describe the DESH programme, its operational elements, preliminary findings, keys challenges and lessons learnt while implementing it in Kamrup district of Assam, India.

# Settings

Assam is a landlocked state in the northeast (NE) India. Among all Indian states, Assam has the highest proportion of medically certified causes of cancer deaths (22.4%) followed by Kerala (16.20%) and Meghalaya (9.0%) [3]. The Kamrup district of Assam has a population (aged  $\geq$ 30 years) of nearly 0.64 million (male-0.34 million; female-0.30 million) with an overall literacy rate of 75.6% (male-81.3%; females 69.5%) and it has two subdivisions namely, Guwahati and Rangia with 12 health blocks [12]. The district Kamrup ranks fourth in terms of highest incidence of cancers (200 cases/100,000 population) in India after Aizawl (271) in Mizoram, Papumpare in Arunachal Pradesh (249), and East Khasi Hills (212) in Meghalaya [3]. Very few women (15-49 years) in the district have been screened for oral (9.4%) breast (7.7%) and cervix (5.3%) cancers [13]. Difficult climatic conditions and poor infrastructure further makes access much more difficult leading to delay in the cancer diagnosis. Thus, early diagnosis through a screening program in this region is the need of the hour.

# Technology

DESH programme revolves around Mobile cancer screening unit, which comprises of a mobile bus with examination setup and mammography machine. The first front compartment of the bus has mammography machine-installed, a radiation unit, computed radiography (CR) reader with cassette and a digital screen display. The imaging starts with X-ray radiation, captured in digital imaging and communication in medicine (DICOM) format, which can be locally viewed in the computer monitor through a CR cassette reader. Picture archiving and communication system (PACS) technology is used for storing, transmitting and retrieving images through an online link. PACS is able to store mammography images using the DICOM standard format, thus making it possible for radiologists to evaluate the images using tools integrated with PACS and access the images using computers located anywhere [14]. Thus, the authorized radiologists can access this through login credentials from any part of the world and prompt reporting can be done.

#### The team

**Programme Staff:** Programme has two different kinds of staff, Programme Management Staff (PMS) in the field office located at BBCI and Mobile bus-based screening staff. The PMS staff include counselors (a tele-counselor and a hospital counselor), a project coordinator, medical doctor (preventive oncologist) and programme manager. The Mobile screening bus has a staff strength of 10 people including a doctor, community mobilization officer (CMO), registration and measurement officer (RMO), radiographer, field counselor, and helper. In addition, mobile screening bus has two drivers and two nurses.

# The process

Launched on 14<sup>th</sup> November 2017, the DESH programme is implemented in 4 out of 12 health blocks, namely, Hajo, Kamalpur, Saulkuchi, Rampur of the Kamrup district covering 0.2 million populations (aged  $\geq$ 30 years) initially.

The DESH programme revolves around three-core principles (1) primary prevention-awareness building (2) secondary prevention- screening and timely referral for treatment (3) tertiary prevention-counseling support.

Following sections describe the DESH programme elements and service delivery process.

#### **A. Physical elements**

**Mobile Screening Bus:** The central element of programme service delivery is a mobile screening bus, which is a well-lighted and fully air-conditioned with two compartments. The first front compartment houses a mammography machine-installed, a radiation unit, computed radiography (CR) reader with cassette and a digital screen display.

The second compartment has a doctor's desk, a patient sitting area with two chairs, an examination table/bed, washbasin, an autoclave, a refrigerator, and screening-related equipment and consumables. The doctor, radiographer, and a dedicated nurse work inside the bus.

Kiosks are placed outside the bus for guiding the incoming beneficiaries. These counters are the registration counter (RMO managed), vitals measurement counter (nurse-managed), and a counseling counter (counsellor managed). The nurse (sitting outside of the bus), RMO and doctor (inside the bus) carry internet-enabled mobile tablets having software application installed to enter beneficiary data. The beneficiary data is uploaded on centrally maintained servers and synchronized daily after completion of field operations at the day end.

A Project Coordinator (PC), reporting to Programme Manager, manages above mentioned activities along with the handling of mechanical issues of screening bus. Additionally, PC and Program Manager creates a monthly plan containing monthly awareness camp schedule (date and village wise) and mobile screening bus route map. As per schedule and route map, mobile screening bus goes to the designated villages from Monday to Friday (10.00 am to 5:00 pm). If beneficiaries are more in numbers and not covered in a single day, CMO communicates the next date of screening bus arrival after consulting with the programme manager.

#### **B.** Operational elements

The whole screening model operates at two levels i.e. community and hospital level, details of which are as below:

#### **Community level operations**

*Awareness:* The CMO leads the awareness activities as per awareness camp schedule. She also informs community members the probable venue and date of screening bus arrival. Figure 1 depicts the typical community level activities on the day of screening.

# **DOI:** 10.21522/TIJPH.2013.07.01.Art009 **ISSN:** 2520-3134



Figure 1. Service flow on the day of screening in DESH programme

*Screening:* The mobile screening unit/bus with all staff and logistics carries out screening as per route map and schedule. Field counselor announces the bus arrival using a loudspeaker system. On screening day, interested community members visit the screening bus.

Figure 2 depicts the screening protocol for oral, breast and cervical cancers.



Figure 2. Cancer screening protocol under DESH programme

Risk Factors for Oral Cancers: Regular Alcohol Use, Tobacco use (in any form), Habit of chewing areca nut/betel nut, Sharp tooth or ill-fitting dentures

High-Risk Factors for Breast Cancer: Family history of breast, ovarian, endometrial or colon, carcinoma (mother, sibling, father), Personal history of breast, ovarian, endometrial or colon carcinoma, History of exposure to radiation to the chest wall for the treatment of Hodgkin's lymphoma or others

Moderate Risk Factors for Breast Cancer: Nulliparity, Early age at menarche (<12 Years), Use of Hormone replacement therapy (HRT), Obesity, Smoking / Alcohol use, Previous breast biopsy, Age at first childbirth >30 years

**Referrals and Counselling:** As per initial screening results including mammography reports from radiologists, the doctor identifies the suspected screen positive cases. The tele-counselor based at BBCI,

who then calls and follows-up with all screen positive cases for further diagnosis and confirmation at BBCI, who are transported by a vehicle provided by PSMRI.

Table 1 shows the screening methods and suspecting points for considering screened positives.

Screening Type	Method	Criteria (Indicative for screen positives)
Oral Cancers	Oral Cavity	• Any lump, patch, red or white lesions in the
	Inspection	mouth.
Breast Cancer	Clinical Breast	1. An asymmetry or retraction of the breasts
	examination and	2. A rash on or around the nipple
	Mammography	3. Discharge/bleeding from one or both nipples
		4. Puckering or dimpling of nipple/skin around
		the nipple
		5. Lump or thickening in the breast
		6. Constant pain in the breast or armpit
		7. Presence of lymph node in the armpit
		8. Presence of lighter shade of grey or white on a
		mammogram
Cervical Cancer	Visualization of the	• The change of color of the cervical epithelium to
	cervix under 5%	white for few minutes after the application of 5%
	acetic acid (VIA)	acetic acid through a swab.

Table 1. Screening methods and indicative suspicion points under DESH programme

#### **Hospital level operations**

*Hospital counseling:* On arrival of screen positive case at BBCI, hospital counselor counsels him/her regarding different processes of investigation and diagnosis. In case of subsequent consultation or investigation, tele counselor follows-up with the patients.

*Diagnosis and confirmation:* After counselling, hospital counselor accompanies every patient during investigation and consultation with the concerned oncologists for confirmation and staging of the carcinoma. All cost incurred during investigations and consultations are borne by PSMRI. Confirmed cancer patients are linked with existing government scheme "Atal Amrit Abhiyan" for cashless treatment and or reimbursement facility. Under this scheme, lower-income families (income < USD 7000 annually) are covered against cancers, kidney, heart, brain and burn-related diseases and injuries. It provides yearly sum of \$ 2900 for medical assistance [15].

The details of beneficiaries visiting hospital are maintained in a manual register for follow up and tracking. The register record date wise details starting from beneficiaries' demography, consultations, investigations, staging of cancers to ongoing treatment types. This data of beneficiaries is in addition to the screening data captured in field.

#### Data collection and management

Beneficiary data is captured through a software application which has different sections for different users i.e. RMO, nurse and the doctor. RMO and nurse cannot see each other's sections while the doctor has complete access to RMO and nurse data interface. At the end of the day, RMO synchronizes day's data for all the beneficiaries on the centrally maintained server for further archiving and analysis. Additionally, RMO also synchronizes the mammography data to the PACS accessed by radiologists for mammogram result reporting.

#### **Ethical considerations**

The program has approval from Government of Assam and also beneficiaries visiting the mobile screening bus for screening are informed about the purpose of screening. Written informed consent are taken from each beneficiary before initiation of screening.

# **DOI:** 10.21522/TIJPH.2013.07.01.Art009 **ISSN:** 2520-3134

#### **Initial findings**

From November 2017 to June 2018, the DESH programme has covered 96 villages in three blocks and screened 3937 beneficiaries (Male-47.4%, Female-52.6%). Out of the total screened population, 157 (4.0%) are initial screen positive (Oral 142; breast 7; cervix 8.) Out of all screen positives, more than a third (62 or 39.5%) visited the BBCI for further diagnosis and confirmation. Among screen positives, 4 beneficiaries are confirmed as oral cancer cases (all male, 3 in stage 1; 1 in stage 3). The two confirmed patients already completed the first round of chemotherapy and radiotherapy sessions after surgery. One patient, as of now, scheduled for chemotherapy sessions. The fourth patient was a relapse of an old case of oral cancer, who died during treatment. The remaining 39 cases are confirmed true negative and other 19 cases are pending for further investigations. Among confirmed cases, the average time taken from screened positive to final diagnosis and confirmation is 6.3 days. Treatment starts immediately after confirmation.

#### The challenges

We faced some below mentioned definite challenges while implementing DESH programme.

#### Human resource

Sustainability of doctor for long is a challenge. Because Assam faces an acute shortage of medical doctors and in addition, young and recently passed medical doctors are inclined to pursue postgraduate training and tend to work in rural areas during their initial career phase only [16]. To tackle this issue, we are creating a pool of lady doctors trained in community or family medicine, and also reaching to medical colleges as a long-term strategy.

Besides, getting local full-time radiologists is a huge challenge. To overcome this, we are actively reaching to interested radiologists through social media and peer contacts.

#### Mammography machine

Due to the unpaved roads and undulating movement during the travel, the mammography machine sometimes suffers from wear and tear leading to occasional machine breakdown.

Extra cushion covers and shock absorbers are placed in the vicinity of the mammography machine, which helps reduce the damages and makes the machine to work consistently.

#### Low turn up of referred cases

So far, only 62 cases (39.5%) out of 157 turned up for diagnosis and confirmation due to most elderly patients are reluctant to visit BBCI considering their age. Additionally, some beneficiaries are ignorant about their condition.

Besides, Programme Manager has collaborated with Government cancer prevention programme and community leaders and also started making home visits to motivate and counsel the screen-positive patients for further confirmation. We can see some improvement in this regard.

#### Data related issue

Data entry initially took a long time than anticipated and the field team found entry process complex and repetitive. Recognising the problem, the Information and Technology team simplified the data entry application.

Finally, despite challenges, this proof of concept serves as a unique platform offering cancer screening services to underserved rural communities. It is an opportunity to build an evidence-based, a cost-effective and replicable model for increasing awareness and early detection of the Oral cavity, Breast and Cervical Cancers in resource-scarce settings.

#### Lessons learnt

Attracting qualified and competent human resources is a challenge. Hence, "Workforce Development and Retention Plan" should be a long-term programme strategy. Programme model need to build partnerships for its effectiveness, and to become sustainable and replicable. Enhancing

community participation and building local stakeholders trust in screening services could be an important strategy for early detection, treatment and cure of cancer in such areas.

# References

[1].Ali I, Wani WA, Saleem K. Cancer Scenario in India with Future Perspectives. Cancer Ther. 2011;8: 56–70. [2].de Souza JA, Hunt B, Asirwa FC, Adebamowo C, Lopes G. Global Health Equity: Cancer Care Outcome Disparities in High-, Middle-, and Low-Income Countries. J Clin Oncol. American Society of Clinical Oncology; 2016;34: 6–13. doi:10.1200/JCO.2015.62.2860.

[3].Directorate of Census Operations[Internet]. District census handbook, Kamrup.Census of India,2011. Available from: http://www.census2011.co.in/district.php. [cited 2018 Aug 10].

[4].Early detection of cancer[Internet]. Geneva:World Health Organization; 2014. Available from: http://www.who.int/cancer/detection/en/ [cited 2018 Jul 16].

[5].Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015;136: E359–E386. doi:10.1002/ijc.29210.

[6].Gadgil A, Sauvaget C, Roy N, Muwonge R, Kantharia S, Chakrabarty A, et al. Cancer early detection program based on awareness and clinical breast examination: Interim results from an urban community in Mumbai, India. Breast. 2017;31: 85–89. doi:10.1016/j.breast.2016.10.025.

[7].Health and Family welfare, Government of Assam[Internet]. Guwahati:Atal Amrit Abhiyan. Government of Assam; 2018. Available from: https://hfw.assam.gov.in/portlet-innerpage/atal-amrit-abhiyan.[cited 2018 Aug 17].

[8].Indian Institute for Population Sciences[Internet]. National Family Health Survey-4. 2015. Avaiable from: http://rchiips.org/NFHS/FCTS/AS/AS\_Factsheet\_Kamrup.pdf [cited 2018 Aug 12].

[9].Kim YS, Chang JM, Yi A, Shin SU, Lee ME, Kim WH, et al. Interpretation of digital breast tomosynthesis: preliminary study on comparison with picture archiving and communication system (PACS) and dedicated workstation. Br J Radiol. British Institute of Radiology; 2017;90: 20170182. doi:10.1259/bjr.20170182.

[10]. Mishra G, Dhivar H, Gupta S, Kulkarni S, Shastri S. A population-based screening program for early detection of common cancers among women in India – methodology and interim results. Indian J Cancer. 2015;52: 139. doi:10.4103/0019-509X.175581.

[11]. Nandakumar A, Anantha N, Venugopal TC. Incidence, mortality and survival in cancer of the cervix in Bangalore, India. Br J Cancer. 1995;71: 1348–52. Available: http://www.ncbi.nlm.nih.gov/pubmed/7779737.

[12]. Office of Registrar General India[Internet]. New Delhi:Report on Medical Certification of Cause of Deaths. 2014. Available from: http://www.censusindia.gov.in/2011-Documents/ mccd\_Report1/ mccd\_report\_2014.pdf [cited 2018 July 15].

[13]. Sharma DC. India still struggles with rural doctor shortages. Lancet. 2015;386: 2381–2382. doi:10.1016/S0140-6736(15)01231-3.

[14]. Sankaranarayanan R, Mathew B, Jacob BJ, Thomas G, Somanathan T, Pisani P, et al. Early findings from a community-based, cluster-randomized, controlled oral cancer screening trial in Kerala, India. The Trivandrum Oral Cancer Screening Study Group. Cancer. 2000;88: 664–73. Available:

http://www.ncbi.nlm.nih.gov/pubmed/10649262.

[15]. Sharma P, Rahi M, Lal P. A community-based cervical cancer screening program among women of Delhi using camp approach. Indian J Community Med. 2010;35: 86. doi:10.4103/0970-0218.62576.

[16]. Thulaseedharan JV, Malila N, Swaminathan R, Esmy PO, Cherian M, Hakama M, et al. Effect of Screening on Variation in Cervical Cancer Survival by Socioeconomic Determinants--a Study from Rural South India. Asian Pac J Cancer Prev. 2015;16: 5237–42. Available: http://www.ncbi.nlm.nih.gov/pubmed/26225659.