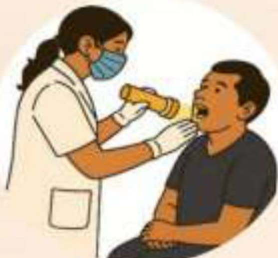
Project Report



Oral Cancer Shield:

Community based Demonstration Project – Awareness and Screening Saves Lives

Now to be Replicated in

Maharashtra

Mumbai

R North
R Central
R South
P North
T
P South
S
K West
K East
N
L
H East
H West
F North
M East
G North
M West
G South
F South
E
D
B
C
A

All 25 BMC Wards Covered

Demonstrated in Mumbai

Households Covered 26,810

Screen positive 1875 (7.49%)

Free treatment for detected cases

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PREFACE

The Centre for Cancer Epidemiology (CCE) at Tata Memorial Centre integrates cancer registry, molecular epidemiology, research, public health service delivery, education and training. One of its primary goals is to generate context-specific evidence and develop scalable, cost-effective and resource-sensitive strategies for cancer prevention and control. The Department of Preventive Oncology, a key division within CCE, leads community-focused and evidence-based cancer control initiatives. With a special emphasis on underserved populations—particularly those from low socioeconomic backgrounds, rural regions and tribal areas—the department focuses on primary prevention, early detection through screening and integration with existing public health systems. Its work in population-based screening, behavioural change interventions and capacity-building of healthcare providers plays a significant role in cancer control efforts across Mumbai and Maharashtra.

This booklet presents one such initiative—a community-based oral cancer awareness and screening program implemented in high-risk urban clusters of Mumbai, in partnership with the Watumull Sanatorium Trust. The program was designed with three core objectives:

- *To raise awareness about the harmful effects of smoking, smokeless tobacco and alcohol among participants and their families.*
- *To assess individual-level exposure to oral cancer risk factors.*
- *To estimate the prevalence of oral precancerous lesions and cancers within low-income urban communities.*

The initiative adopted a targeted, opportunistic approach to enable early diagnosis and timely referral to treatment. Key strategies included structured health education, oral visual inspection, tobacco cessation support, standardised referral systems and streamlined linkages to treatment facilities. By integrating awareness, risk stratification, screening and follow-up care, the program aimed to improve early detection and treatment outcomes.

This booklet outlines the program's structure, implementation, challenges and key insights, serving as a practical guide for public health professionals, program implementers and policymakers interested in initiating or scaling up similar community-based oral cancer screening programs.

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ABBREVATIONS

CCE	Centre for Cancer Epidemiology
DMG	Disease Management Group
TMC	Tata Memorial Centre
TMH	Tata Memorial Hospital
OVI	Oral Visual Inspection
WHO	World Health Organization
IARC	International Agency for Research on Cancer
NCD	Non-Communicable Disease
CSR	Corporate Social Responsibility
IEC	Information, Education and Communication
GATS	Global Adult Tobacco Survey
NFHS	National Family Health Survey
MoU	Memorandum of Understanding
OPD	Outpatient Department
TCC	Tobacco Cessation Counselling
SPSS	Statistical Package for the Social Sciences
LMICs	Low-and Middle-Income Countries
PPV	Positive Predictive Value

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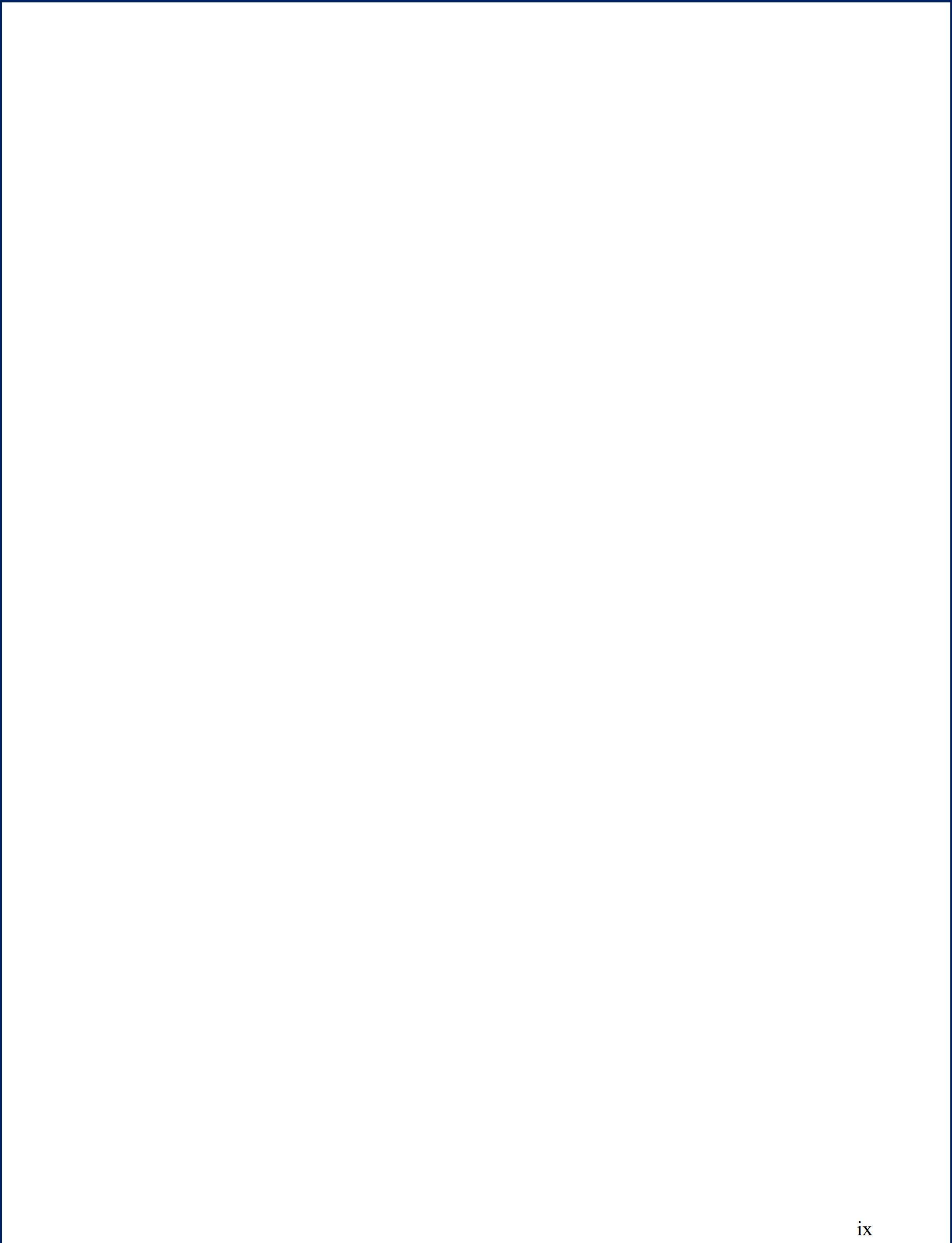


Background

The global health ecosystem has undergone rapid transformation since the onset of the 20th century. A major epidemiological shift has taken place, marked by the rising dominance of Non-Communicable Diseases (NCDs) as the leading cause of morbidity and mortality.

Health systems across the world continue to adapt to this evolving landscape. Cancer remains one of the most complex and challenging public health problems globally. Its clinical and population-level epidemiology is distinct from that of other non-communicable diseases (NCDs), requiring specialised approaches to its control and management. While treatment modalities and curative options have advanced significantly over the years, mortality rates in many cancers still surpass survival outcomes. Consequently, prevention remains the cornerstone of efforts to reduce the public health burden of cancers.

Globally, 19.97 million people are diagnosed with cancer annually and 9.74 million individuals die due to cancer.(1) Out of these 1.41 million new cancer cases are in India, 916 thousand individuals die in India from cancer every year. The incidence-mortality ratio in India is around 65.4 compared to the global figure of 48.7.(2)

Oral cavity cancers include cancers of the lips, tongue (Excluding Lingual Tonsils), gums, floor of the mouth, palate and other parts of the mouth, which may be unspecified.(5) Oral cavity cancer ranks 16th in the world in terms of cancer incidence and 15th in terms of mortality.(6) (7) There is a marked regional variation in the distribution of oral cavity cancers.

India has the highest number of Oral cancer patients globally, accounting for almost 1/3rd of the global case load. Oral cancer is the leading cause of cancer in males and 4th most common cancer in females in India. More than 1,40,000 cases occur annually (incidence rate of 9.9 per 100,000) and the age-standardised mortality rate is 5.6 per 100,000 population. (8) In Maharashtra, 11% of all cancers diagnosed in men were oral cavity cancers.(3) The cancer prevalence in Mumbai was 97.3 per 100,000 population. (3) Around 15% of all cancers diagnosed in Mumbai were Oral cavity cancers.(4)

Globally, Tobacco use prevalence is 1.3 billion users. This includes both smoking and smokeless tobacco users. (9) Tobacco is the single most important risk factor for oral cavity cancers.(10)

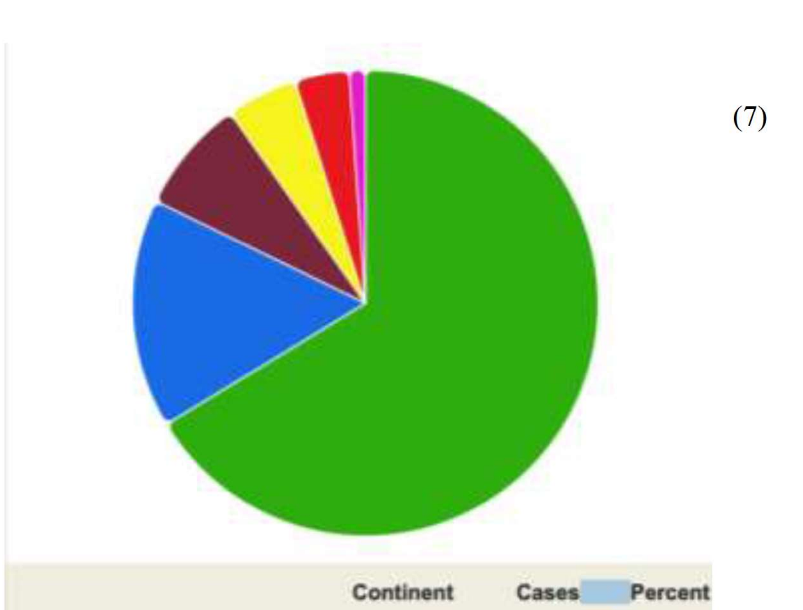
In India, despite improved tobacco control measures, 28.6% adults and a total 266.8 million people, use tobacco. Among them, betel quid, khaini and other smokeless forms of tobacco users make up for 21% of use.(11) In the state of Maharashtra, 35.5% men, 17.0% women and 26.6% adults in general consume tobacco in some form, either by using smoking or using smokeless products.(12) A community-based survey in Mumbai covering seven areas with a total population of 68,481, reported an overall tobacco use prevalence of 21.77%. Among them, 21.27% of males and 22.30% of females were tobacco users. Masheri, a type of burned tobacco, which is a form of smokeless tobacco, accounted for 68.9% of users.(4)

Smokeless Tobacco use has been attributed to a 2-fold to 15-fold increase in risk of developing Oral cavity cancers.(13) The majority of these users belong to the low socio-economic strata.(14) In India, Oral cancer prevalence is projected to reach an incidence rate of 10.5 per 100,000 population and Prevalence of 29.3 per 100,000 population by 2030.(15)

This will lead to a significant burden for the individual, family, communities and health systems. Treatment and management of cancers cause emotional, physical and economic strain on individuals. Resources needed for cancer diagnosis, management and palliative care of patients pose a policy concern in a resource-limited setting. Hence, oral cancer remains a problem of public health importance.

Prevention and control of oral cavity cancers is the need of the hour; proactive policy and programmatic implementation measures have to be undertaken to address them and get ahead of the curve.

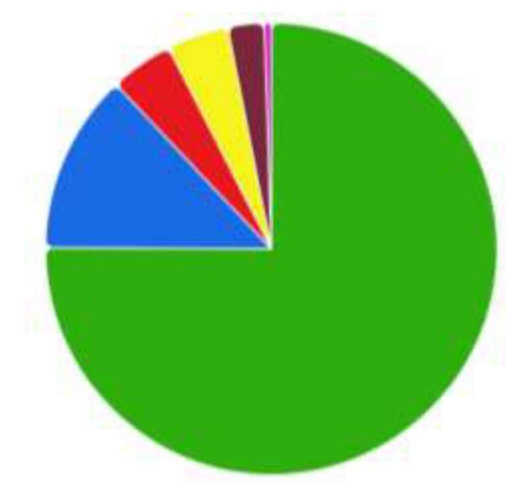
(7)



Continent	Cases	Percent
Asia	258 440	66.3%
Europe	62 073	15.9%
Northern America	30 992	7.9%
Latin America and the Caribbean	19 301	5.0%
Africa	14 702	3.8%
Oceania	4 338	1.1%

Incidence, both sexes

Figure 2: Absolute Numbers, Incidence, Oral Cancers Global Distribution



Continent	Deaths	Percent
Asia	141 465	75.1%
Europe	24 253	12.9%
Africa	8 542	4.5%
Latin America and the Caribbean	8 343	4.4%
Northern America	4 896	2.6%
Oceania	939	0.50%

Mortality, both sexes

Figure 1: Absolute Numbers, Mortality, Oral Cancers Global Distribution

Introduction

Prevention is one of the fundamental functions of public health. It emphasizes directed strategies to reduce incidence, prevalence, morbidity, mortality and other burdens associated with diseases. Prevention can be either primary, secondary or tertiary. Primary Prevention involves stopping a disease before it occurs, that is, identifying risk factors and intervening to prevent their occurrence. Secondary prevention involves methods for early detection, treatment and cure, when the disease has occurred. Tertiary prevention are methods employed to prevent long-term and debilitating complications from occurring in diseased individuals.

Figure 3: Levels of Prevention

Primordial Prevention
Goal: Prevent the emergence of risk factors
Focus: Social and environmental conditions
Example: Promoting healthy lifestyles in children, urban planning for physical activity

Primary Prevention
Goal: Prevent onset of disease
Focus: Risk factor modification
Example: Immunization, tobacco cessation programs, healthy diet campaigns

Secondary Prevention
Goal: Early detection and treatment
Focus: Screening and early diagnosis
Example: Pap smears, oral cancer screening, mammography

Tertiary Prevention
Goal: Reduce complications and improve quality of life
Focus: Rehabilitation and management
Example: Support for oral cancer patients, physiotherapy, speech therapy

Quaternary Prevention
Goal: Avoid overmedicalization and protect patients
Focus: Prevent harm from unnecessary interventions
Example: Avoiding unnecessary biopsies, rational use of antibiotics

Primary prevention of oral cancers revolves around three key strategies: 1. Raising awareness about risk factors, 2. Tobacco Cessation Services 3. Promoting and educating about Screening and early detection methods. (14) Community engagement for information dissemination, oral cancer and tobacco education and risk communication (IEC) has been shown to have a significant impact on cancer incidence. (16) Tobacco counselling and cessation are critical steps in oral cancer prevention, especially in the Indian context, where tobacco accounts for 90% of oral cavity cancers.(17)

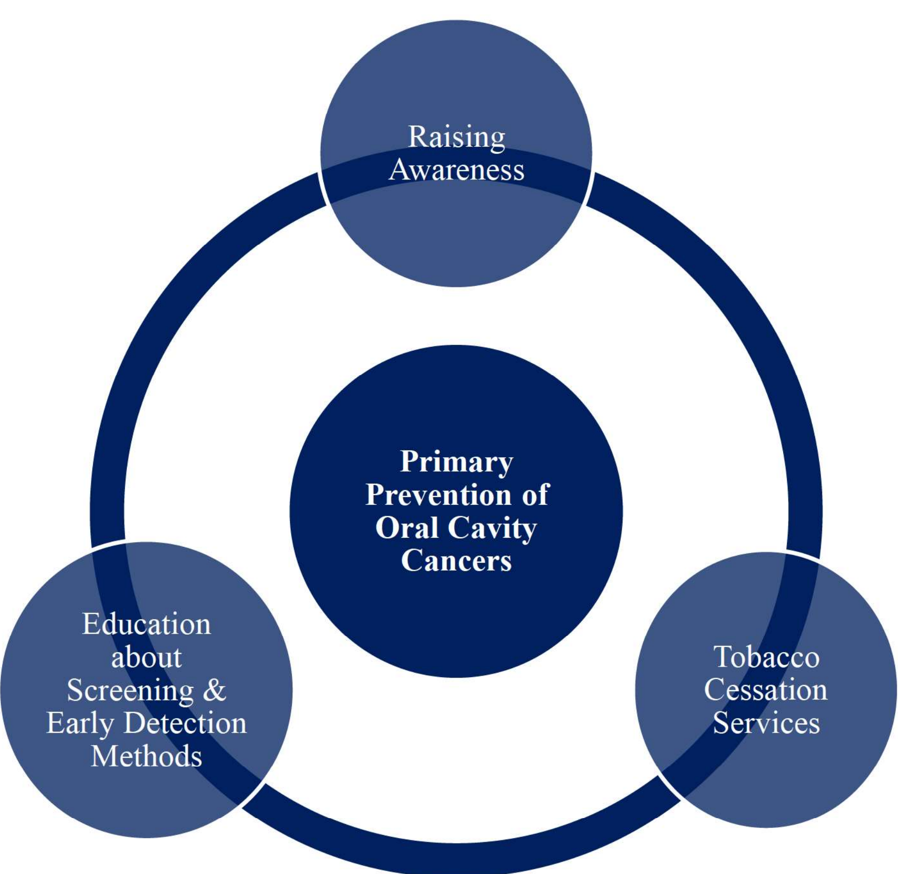


Figure 4: Primary Prevention of Oral Cavity Cancers

Screening, along with early detection/ diagnosis, are the pillars of secondary prevention in oral cancers. The unique pathogenesis and natural history of disease progression in cancers provide us with an opportunity to detect the disease at a stage where cancer development can be prevented. Some cancers have recognised and well-understood pre-cancerous lesions. These lesions can be easily identified, diagnosed and treated to prevent cancer occurrence. Screening can also help in

early detection and diagnosis, leading to down-staging of the disease and further reducing mortality.

Oral cancer has established and documented pre-cancerous lesions.(18) The oral cavity can be examined with ease and the procedure is non-invasive and non-traumatic. Oral cancers are among the four cancers (Cervical, Breast, Colorectal) (19) for which evidence exists supporting the effectiveness and feasibility of screening. Screening for oral cancer satisfies all the required parameters to be considered for population implementation. (13)

According to the expert group of IARC on oral cancer prevention (13), there is variable sensitivity and specificity of Clinical Oral Examination (Same as Oral Visual Inspection) in detecting Oral Pre-malignant lesions when administered to the general population.

Pre-test probability can be increased by conducting screening in a high-risk population with higher prevalence. Also, the sensitivity of the screening technique can thus be augmented. Hence, screening for oral cancers among tobacco, alcohol and other comorbid users will yield higher test performance.

One of the biggest Clinical trials on oral cancer screening conducted in Trivandrum, Kerala, demonstrated the effectiveness of the Oral Visual Inspection technique in preventing Oral cancer mortality among tobacco, alcohol and both tobacco-alcohol users. (20)

India has the highest burden of oral cavity cancers in the world. Despite this, the implementation of national and State level population-based screening program for oral cavity cancers is poor.

A good cancer screening program is more than just a one-time test; it is a structured process that ensures individuals at risk are systematically identified, invited, screened, diagnosed, treated and followed up**.** According to the International Agency for Research on Cancer (IARC), the World Health Organisation (WHO) and global best practices, the effectiveness of a screening program depends on several interconnected components that form a continuum of care.(14)

Department of Preventive Oncology and the Watamull Sanatorium Trust conducted a service project titled "Oral cancer screening among high-risk population residing in low socio-economic settings in Mumbai" from July 2022 to July 2024. This document will demonstrate the operations, functions, management and implementation framework of the project and share the outcome and experiences from the project.

Project Overview

1. Statement of Purpose

The Department of Preventive Oncology and the Centre for Cancer Epidemiology have been working at the grassroots level to advance cancer prevention in urban, underserved populations of Mumbai for over two decades. This program was envisioned to establish a demonstrable, sustainable and replicable model for community-based oral cancer screening among high-risk populations. Its core objective was to raise awareness about the harmful effects of tobacco and alcohol, identify individuals at risk for oral cavity cancer and estimate the burden of precancerous and cancerous lesions within this underserved population. Central to the program was the development and integration of a robust referral and diagnostic pathway, ensuring that screen-positive individuals received timely evaluation, diagnosis and access to appropriate treatment and tobacco cessation services.

2. Stakeholders

1. Watumull Sanatorium Trust
2. Local Political Leaders and Community Influencers
3. Laboratory Services at TMH
4. Clinical Services at TMH

3. Funding agency/Partner

Watumull Sanatorium Trust, CSR funding supported this project

4. Duration of Project

Two years, from June 2022 to July 2024. Services were extended beyond the defined period to ensure follow-up and treatment continuity. Mop-up camps were conducted to ensure completion of screening and referral services.

5. Project locations

All 25 wards of Brihanmumbai Municipal Corporation (BMC), Mumbai, Maharashtra, were covered

Table 1: Wards of Mumbai

Sr. No	Name of the Wards
1	Ward A
2	Ward B
3	Ward C
4	Ward D
5	Ward E
6	Ward F South
7	Ward F North
8	Ward G South
9	Ward G North
10	Ward H East
11	Ward H West
12	Ward K East
13	Ward K West
14	Ward P South
15	Ward P North
16	Ward P East
17	Ward R South
18	Ward R Central
19	Ward R North
20	Ward L
21	Ward M East
22	Ward M West
23	Ward N
24	Ward S
25	Ward T

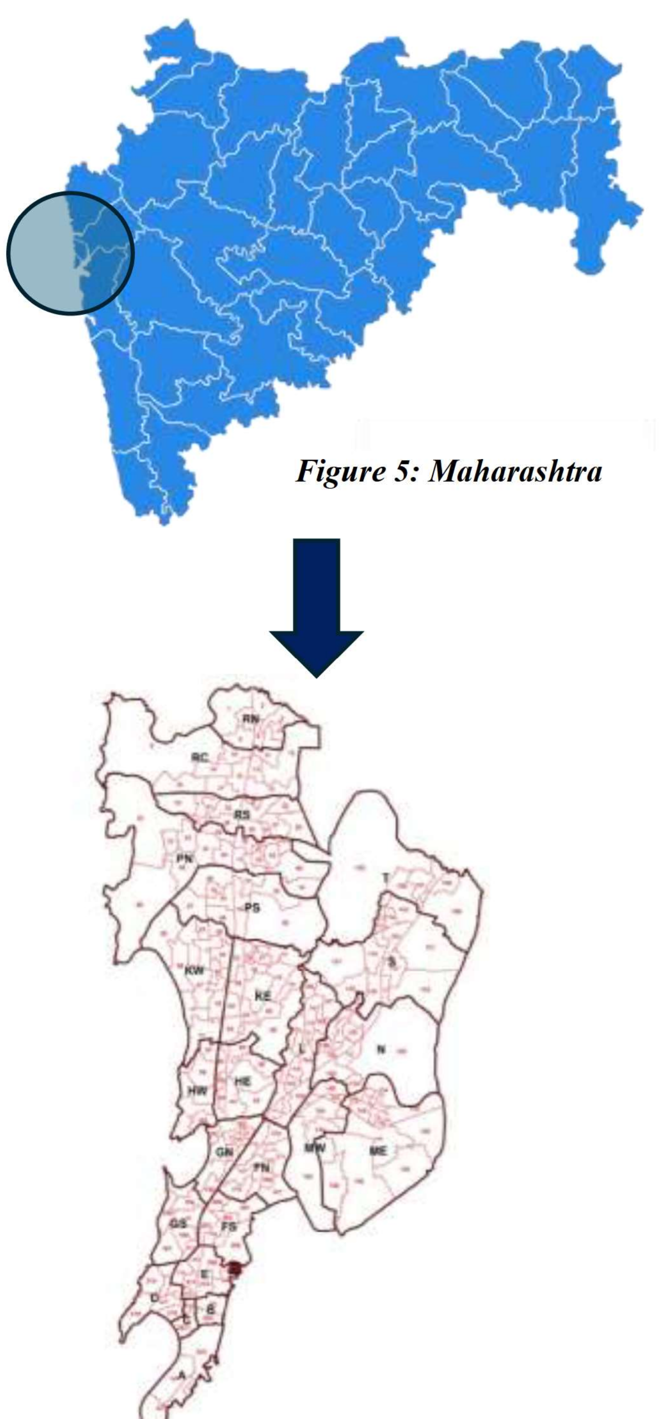


Figure 5: Maharashtra

Figure 6: 25 Wards of BMC Mumbai

Implementation Principles

1. *Contextual Adaptation*

The program was tailored to the epidemiological profile and healthcare infrastructure of Mumbai's underserved communities. Local needs assessment and ward-level mapping were conducted to guide deployment, consistent with WHO's recommendations for context-driven NCD interventions WHO, 2023 NP-NCD Operational Guidelines.

2. *Reach and Accessibility*

High-risk individuals were proactively identified via a door-to-door survey, increasing screening uptake. Camps were conducted within communities to minimise barriers to access, consistent with WHO's strategy of decentralising cancer control services in LMICs.

3. *Health System Integration*

The program was embedded within an existing tertiary cancer care system (Tata Memorial Centre) to ensure linkage from screening to diagnosis and treatment. This aligns with WHO and IARC recommendations on integrating cancer screening into broader health systems to ensure continuity of care and avoid dropouts.

4. *Workforce Capacity and Training*

A multidisciplinary team of Medical Officers, health workers and social workers were trained using standard protocols, ensuring fidelity to the screening process. Training was informed by IARC's practical manuals on early detection and WHO's competency frameworks.

5. *Digital Innovation for Monitoring*

A web-based data collection system was developed for enhanced real-time validation of Data from the field, monitoring and follow-up, facilitating implementation tracking and dynamic improvements.

Integrated Evaluation and Feedback

- The program incorporated structured monitoring through quarterly reports and on-site feedback loops, aligning with WHO's framework for implementation research in cancer control.

Project Planning

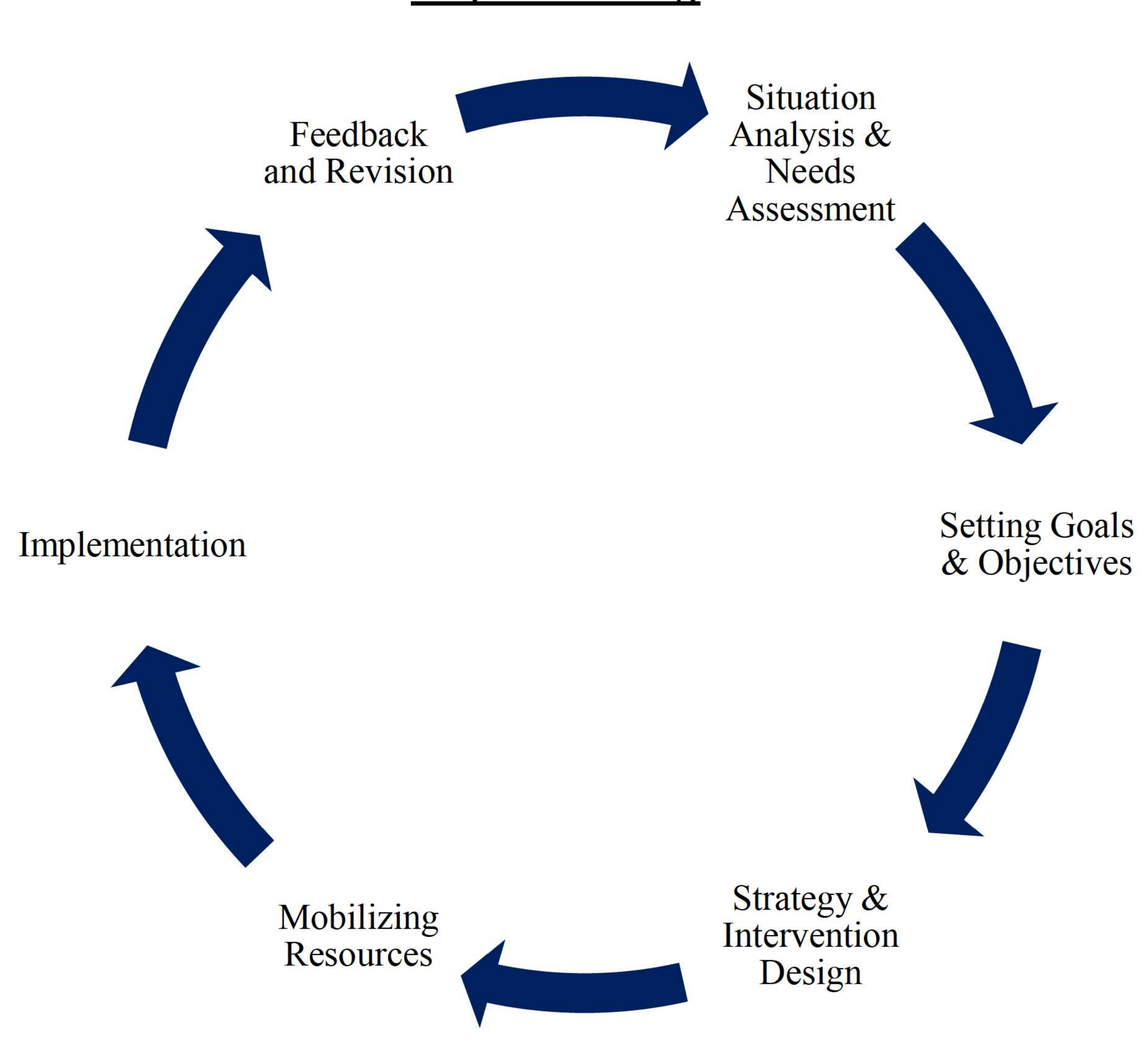


Figure 7: Planning

1. Situation Analysis and Needs Assessment

A comprehensive situation analysis conducted before program implementation revealed a substantial burden of tobacco consumption, particularly smokeless tobacco, among residents of low socio-economic strata. Epidemiological data from national surveys such as the Global Adult Tobacco Survey (GATS) and the National Family Health Survey (NFHS) confirmed that Maharashtra ranks among the states with the highest prevalence of smokeless tobacco use, with markedly low levels of awareness regarding oral cancer risk factors and symptoms. Furthermore, oral cancer screening coverage remained critically low (<2%) and existing referral mechanisms

were poorly integrated, contributing to delays in diagnosis and treatment. These findings underscored the need for a structured, community-based intervention incorporating health education, systematic screening using Oral Visual Inspection (OVI) and streamlined referral and diagnostic pathways tailored for the structural vulnerabilities of the high-risk populations.

2. *Setting Goals and Objectives*

Specific objectives included: Increasing awareness about the health risks associated with tobacco and alcohol use; identifying individuals with high-risk behaviours; estimating the prevalence of oral precancerous and cancerous lesions; and establishing an integrated referral system to ensure timely diagnostic evaluation and treatment at the Tata Memorial Hospital. These objectives were aligned with national cancer control priorities and WHO-recommended approaches for NCDs prevention. For this service project, we included 1000 participants per ward.

3. *Program Strategy and Intervention Design*

The program adopted a multi-tiered, community-based strategy to address the burden of oral cancer among high-risk populations. Interventions were designed to be cost-effective, scalable and aligned with WHO-recommended approaches for cancer screening and prevention. Key components included: conducting door-to-door surveys to identify high-risk individuals based on tobacco and alcohol use; delivering structured health education sessions to raise awareness about oral cancer risk factors, early signs and prevention; and implementing low-cost oral cavity screening through Oral Visual Inspection (OVI) at mobile camps. A digital data capture system was developed to streamline registration, risk assessment and follow-up tracking. Integral to the strategy was the integration of a referral and diagnostic pathway with Tata Memorial Hospital, ensuring timely evaluation and management of screen-positive cases. The design also incorporated capacity building through staff recruitment and hands-on training in screening protocols, tobacco cessation counselling and patient navigation.

4. *Mobilizing Resources*

- **Funding Acquisition**:
    - The process began with identifying potential funding sources and successfully securing Corporate Social Responsibility (CSR) support from the Watumull

Sanatorium Trust. A Memorandum of Understanding (MoU) was formalised, outlining financial commitments for 2022–2024.

- **Human Resource Planning and Recruitment**:
  - A staffing plan was developed based on the operational needs of awareness, screening and referral activities. Recruitment of 12 key personnel—including Medical Officers, Medical Social Researchers, Medical Social Workers and Health Assistants, Peon/Porters—was conducted in July 2022.
- **Training of Personnel**:
  - All recruited staff underwent structured training covering oral cancer epidemiology, Oral Visual Inspection (OVI) techniques, tobacco cessation counselling, data management and patient navigation. Training was conducted through expert-led sessions and hands-on demonstrations.
- **Procurement of Equipment and Supplies:**
  - Medical supplies, screening tools, educational materials and digital devices (Tablets) were procured through the indent system of TMH. Camp logistics, including registration infrastructure, IEC materials and protective equipment, were organised in advance of field deployment.
- **System and Infrastructure Setup:**
  - A web-based data collection application was developed by the TMH IT Department to support real-time, standardised documentation of participant data. Referral coordination mechanisms and hospital linkage protocols were established with the Tata Memorial Hospital.
- **Community Engagement and Local Support**:
  - Community mobilisation was achieved by engaging local political leaders and stakeholders in each ward. Their involvement was instrumental in securing permissions and facilitating access to screening locations.

5. Implementation

Implementation was planned using a step-by-step operational framework covering all key components: community engagement, household listing, camp setup, education, screening, referral and follow-up. A pilot was conducted in one ward to test field logistics, data collection tools and screening flow. The pilot helped identify issues related to space, workflow and digital entry, which were addressed before full-scale rollout. Feedback from field teams informed minor revisions in training and camp procedures. The final model was standardised and applied across all wards to ensure consistency and efficiency.

6. Feedback and Revision

The feedback and revision processes were embedded throughout the project lifecycle to ensure adaptive implementation and quality improvement. Quarterly progress reports, along with utilisation certificates, were submitted to the funding agency, Watumull Sanatorium Trust, enabling ongoing financial and operational oversight. Field-level feedback was regularly collected from staff, community members and screened participants to identify logistical challenges, such as campsite accessibility, participant follow-up barriers and data entry issues. These insights informed mid-course corrections, such as optimising camp locations, enhancing participant navigation to Tata Memorial Hospital and refining the digital data collection tool. Internal review meetings were conducted with project supervisors and the Department of Preventive Oncology to assess referral compliance, diagnostic turnaround times and tobacco cessation outcomes. This feedback mechanism ensured the project remained responsive to ground realities and maintained alignment with its screening and referral objectives.

Methods And Materials

Monitoring and Evaluation

Defining Target Population

Selecting Screening Test

Referral and follow up mechanisms

Staffing

Awareness Materials

Data Management Tools

Recruitment of Participants

Screening Procedures

Linkage to Diagnostic facility

Referral Pathway

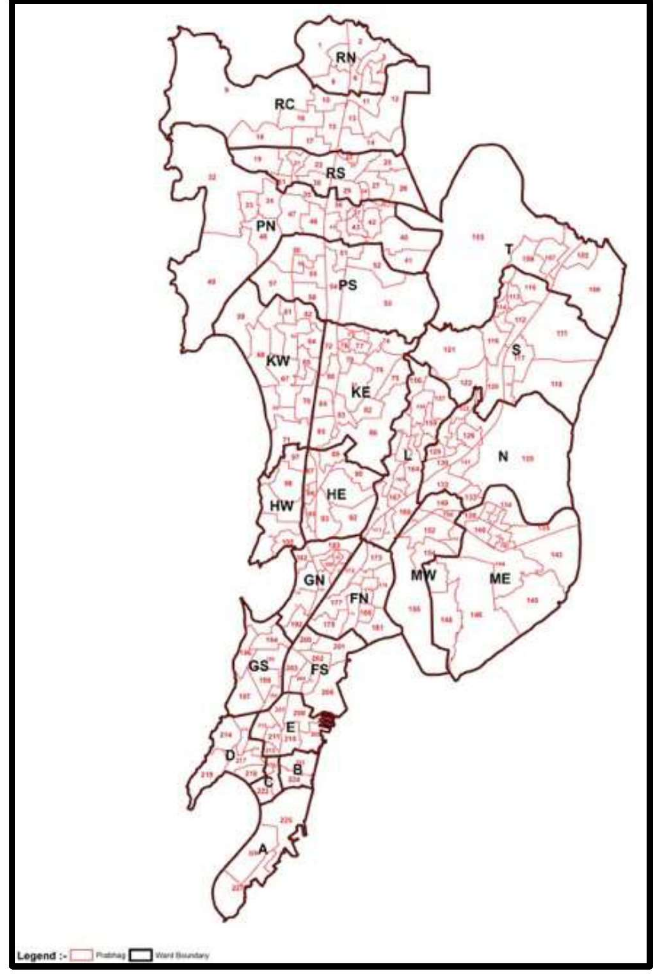
Linkage to Treatment Facility

Policy and and Leadership

Figure 8: Materials and Tools

1. Target Population:

Low-income, high risk tobacco and/or alcohol users residing in 25 wards of BMC Mumbai



2. Screening test Selected:

Oral Visual Inspection (OVI)

3. Recruitment of Participants:

Door-to-Door survey

4. Eligibility Criteria:

- Adults aged 18 years and above

- Current or former tobacco users (smokeless or smoking)
- Individuals with alcohol use**,** with or without tobacco
- Residents of low socio-economic areas within the 25 BMC wards
- Willing to provide informed consent for participation
- Available to attend the screening camp in their locality

5. *Exclusion Criteria*

- Any acute or chronic health condition that restricts them from participating in the study
- Any active infectious disease.

6. *Awareness Tools:*

Flipcharts, Calendar Charts and posters

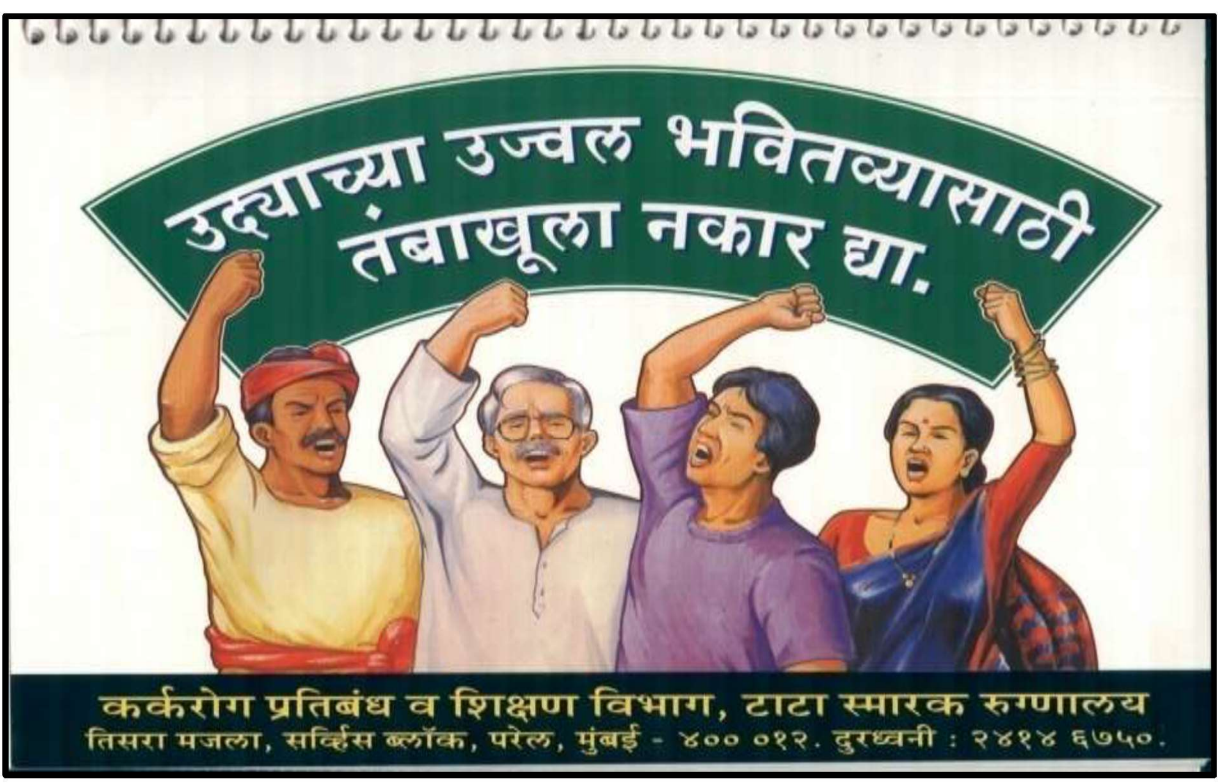
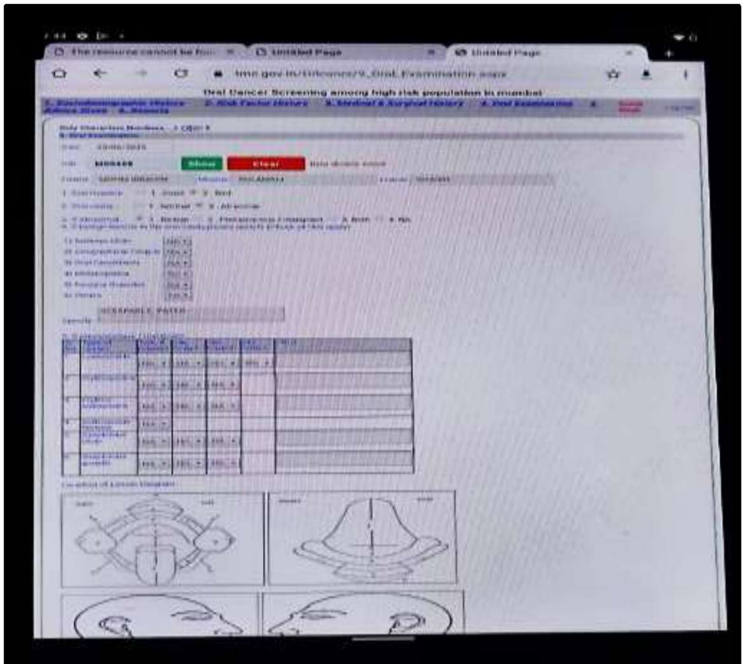


Figure 10: Awareness Material; Flipchart

7. Data management tools:

Developed web-based data collection portal, with electronic data collection using tablets/mobile phones and cloud-based data storage.



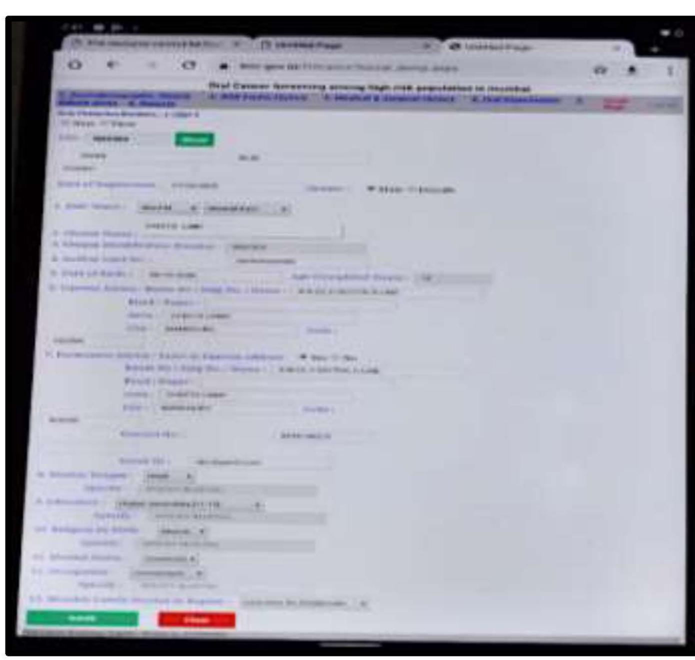


Figure 11: Data Collection using Tablets

Figure 12: Project Staff Using Tablets for Data Collection/Entry

8. **Referral Pathway:**

Linkage to tertiary cancer care facilities at the Tata Memorial Hospital, Mumbai. Figure 13.

9. Monitoring and Evaluation:

Real-time monitoring of the project process and quality assurance using a web-based dashboard (pg.20)

10. **Policy and Governance:**

Leadership through regular project reports ensured ownership of the project by ground-level staff. All continuous feedback to the staff and Stakeholders ensured their support.

Referral Pathway

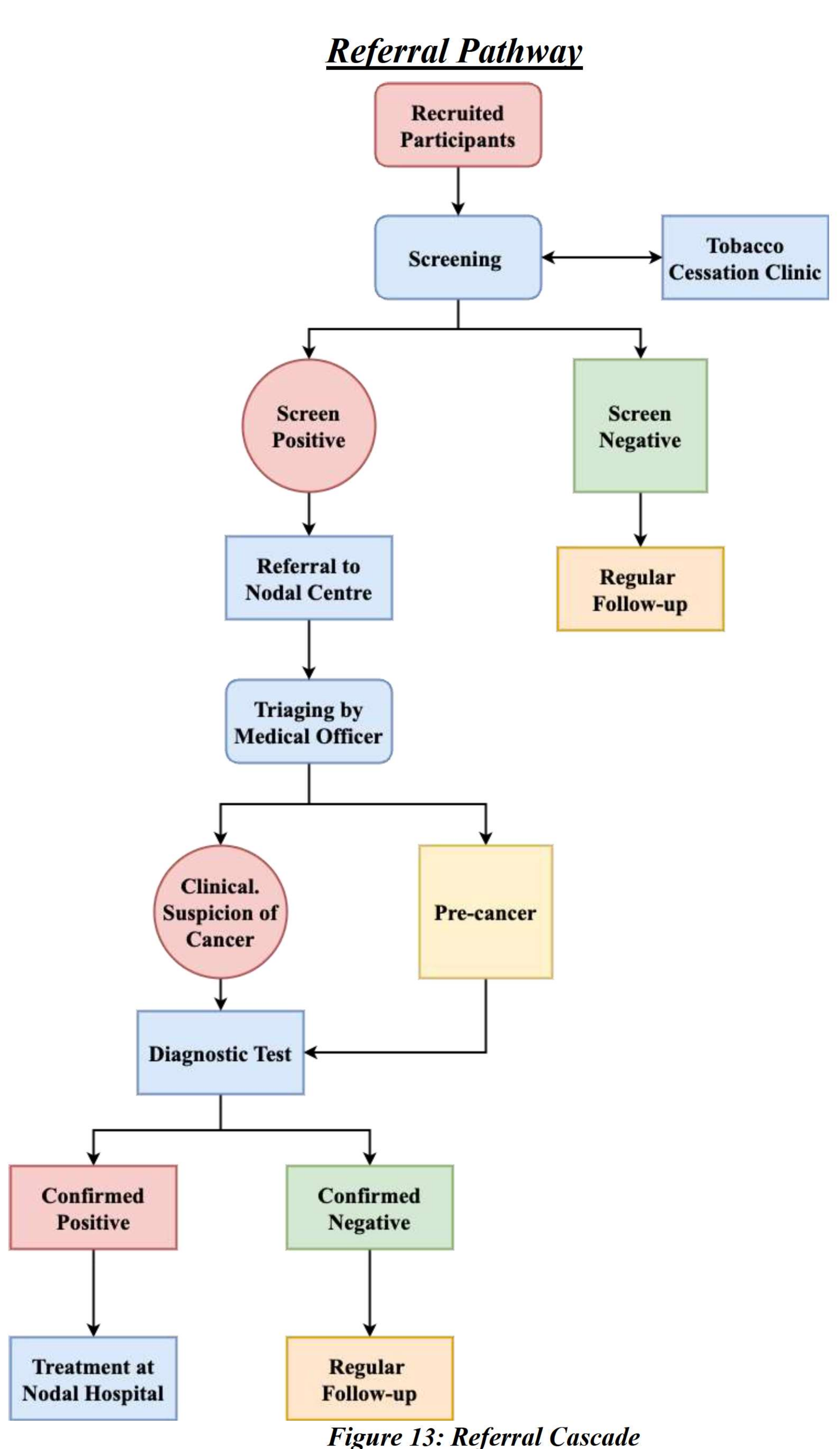


Figure 13: Referral Cascade

Monitoring And Quality Assurance

Monitoring and Quality assurance were integrated into all stages of the project. Data from household surveys, awareness sessions, screening, referrals and follow-ups were recorded digitally using a web-based application. Regular data reviews were conducted to assess screening coverage, referral compliance and diagnostic outcomes. Quarterly progress reports and utilisation certificates were submitted to the funding agency. Internal review meetings were held to identify operational issues and take corrective actions. Follow-up status of referred participants was monitored through phone calls and hospital records. Data was extracted and analysed using SPSS to generate summaries for reporting and decision-making.

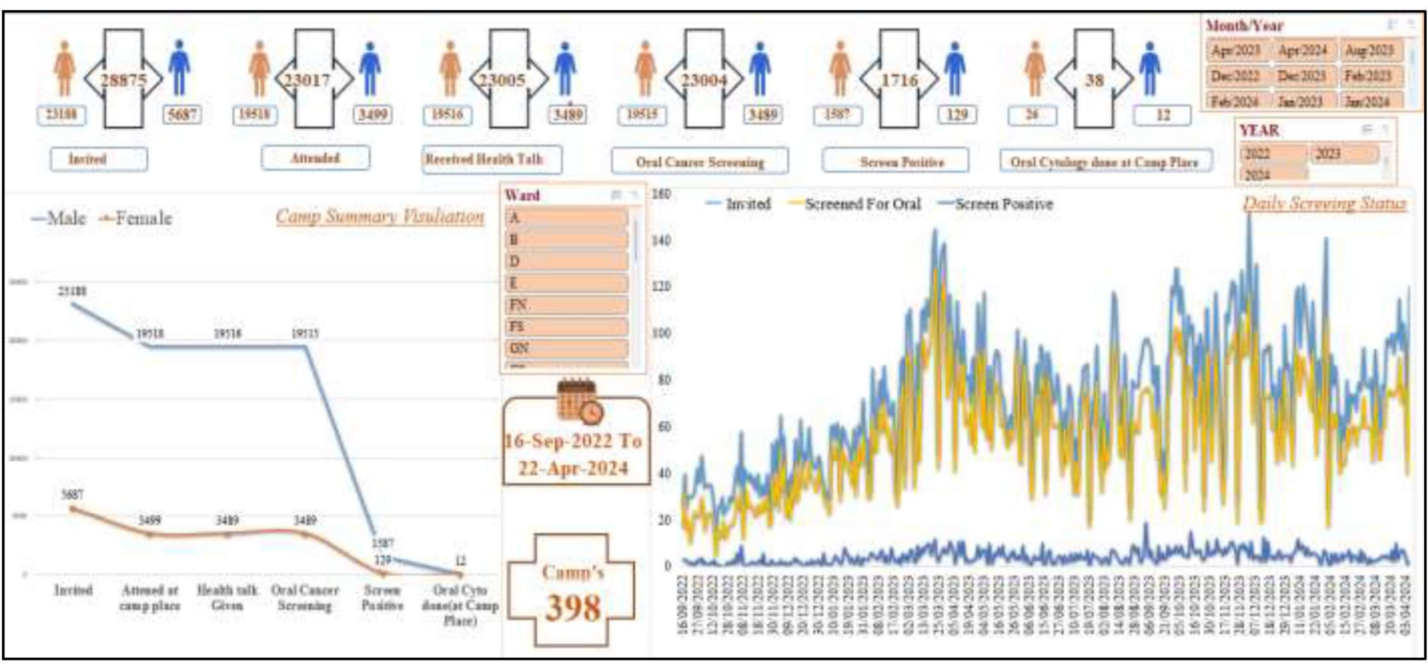


Figure 14: Project Dashboard for Periodic Monitoring and Surveillance.

Figure 15: Internal Review Meetings: Project Staff Briefing

Procedures

1. Training of Project staff

The training was conducted at the Tata Memorial Hospital. It focused on procedural readiness for field implementation. Training included area mapping, steps for ensuring stakeholder engagement, procedures for house-to-house survey and conducting a standardized cancer awareness program. Sessions included training on oral visual inspection techniques, identification of precancerous lesions, tobacco and alcohol use history taking for Risk Factor Assessment and completion of structured questionnaires. Staff were trained in filling consent forms, managing camp logistics and using tablets for digital data entry. The process also included orientation to patient referral protocols, registration workflows at the hospital and tobacco cessation counselling steps. Each cadre, Medical Officer, Health Assistants and Medical Social Workers also received role-specific training.

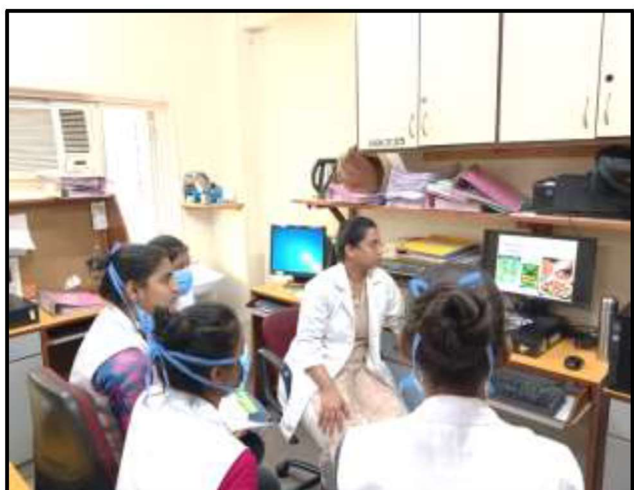


Figure 16: Training of Project Staff

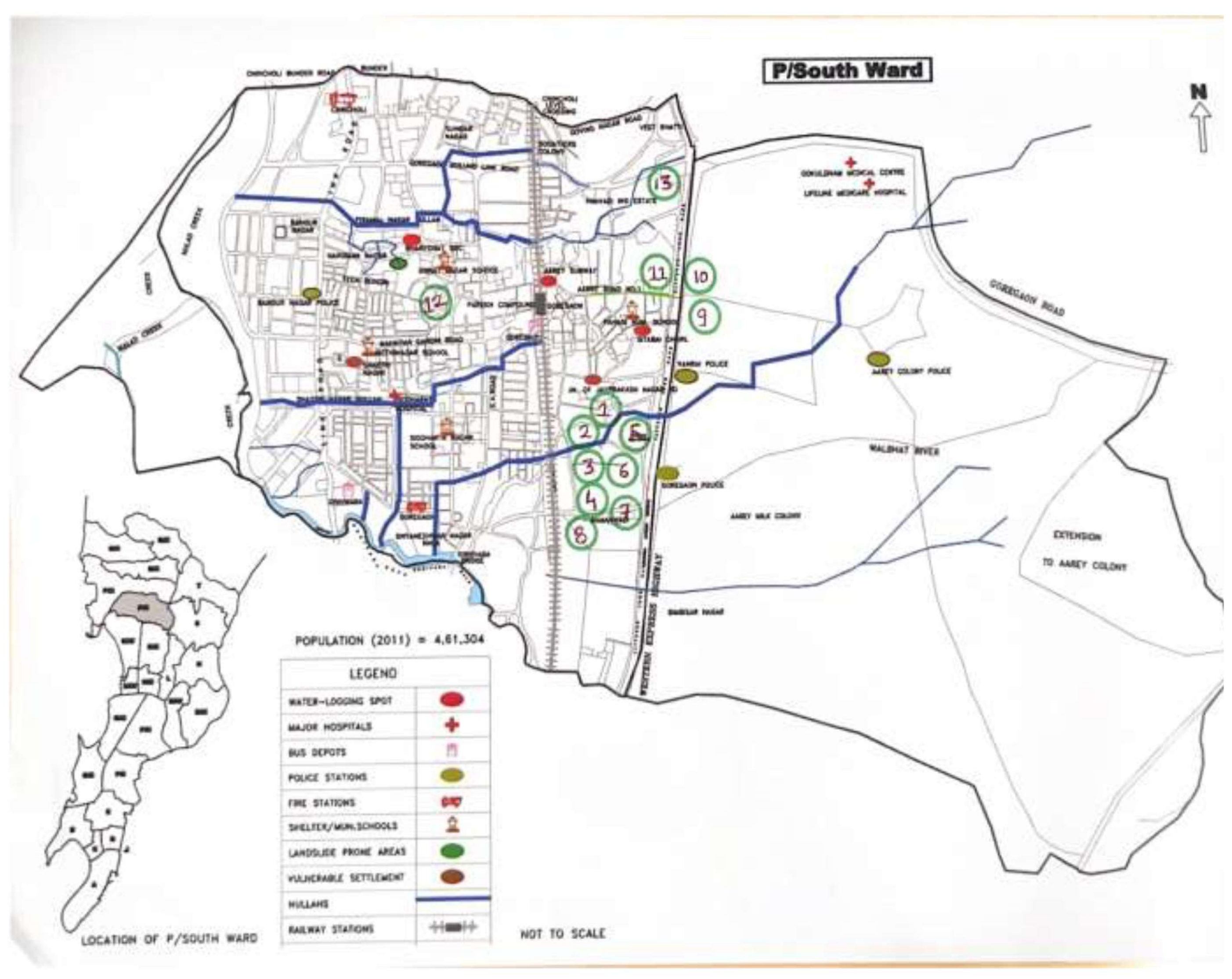
2. Community Approvals and Permissions

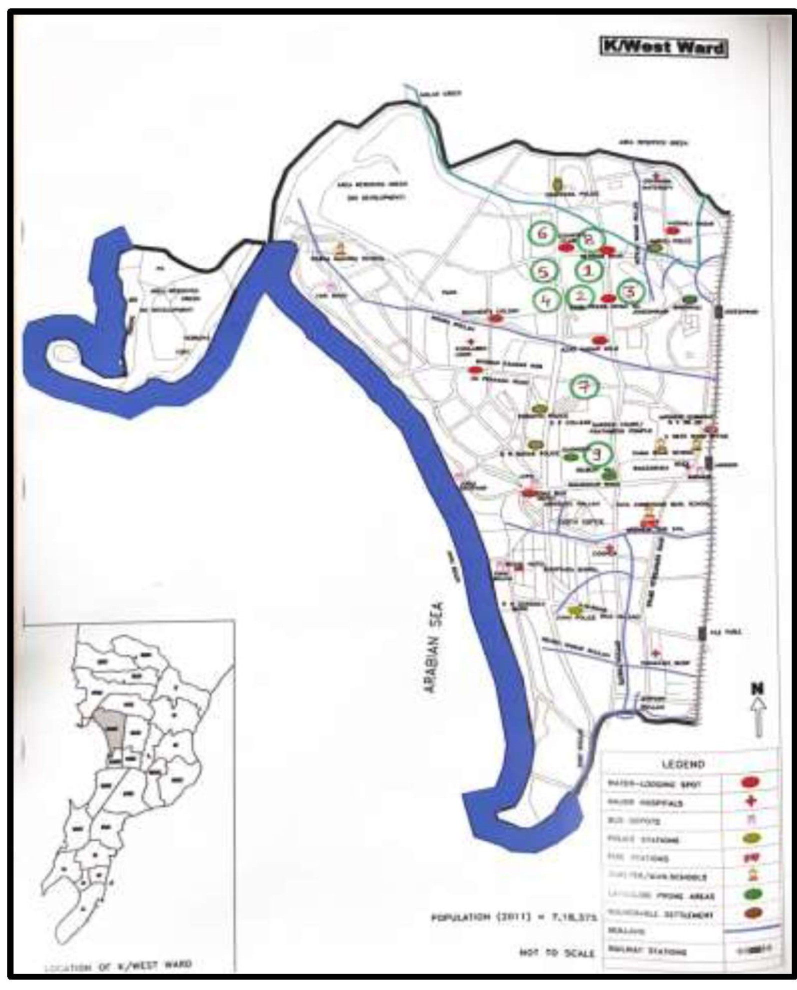
Before field activities commenced, the project team initiated outreach to local political representatives, influential community figures and religious leaders across all 25 target wards in Mumbai. This engagement served multiple purposes: it established community-level legitimacy, facilitated access to venues such as community halls, schools and temples and encouraged local support in mobilizing residents for participation.

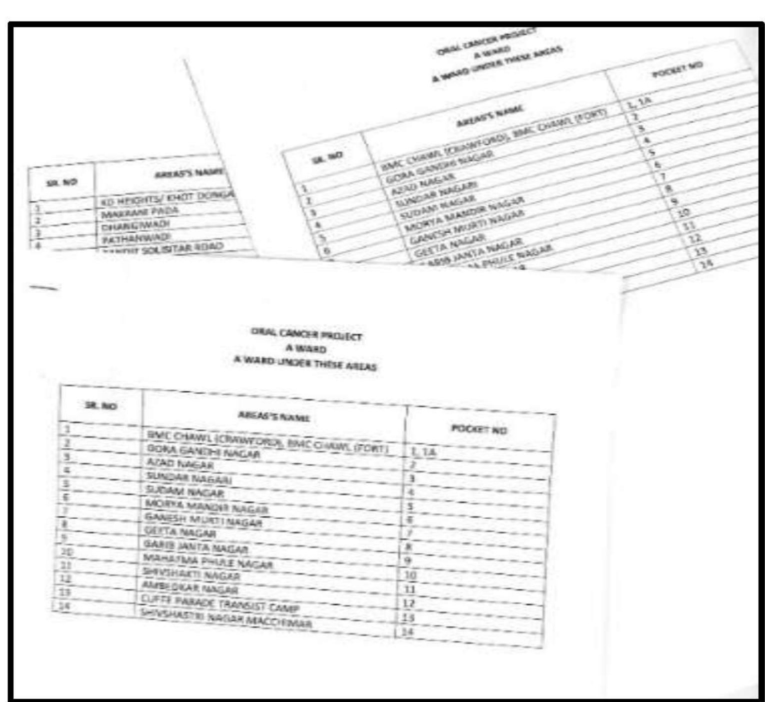
Figure 17: Project team with community leaders

3. *Mapping and Line Listing*

All 25 wards in the project were mapped.







ORAL CANCER PROJECT
A WARD
A WARD UNDER THESE AREAS

SR. NO	AREAS'S NAME	POCKET NO
1	BMC CHAWL (CRAWFORD), BMC CHAWL (FORT)	1, 1A
2	GORA GANDHI NAGAR	2
3	AZAD NAGAR	3
4	SUNDAR NAGARI	4
5	SUDAM NAGAR	5
6	MORYA MANDIR NAGAR	6
7	GANESH MURTI NAGAR	7
8	GEETA NAGAR	8
9	GARIB JANTA NAGAR	9
10	MAHATMA PHULE NAGAR	10
11	SHIVSHAKTI NAGAR	11
12	AMBEDKAR NAGAR	12
13	CUFFE PARADE TRANSIST CAMP	13
14	SHIVSHASTRI NAGAR MACCHIMAR	14

Figure 18: Mapping and Preparation of Survey Lists

4. *Door-to-door Survey*

The project staff conducted a door-to-door survey to identify the high-risk individuals and recruit them. They were invited to attend the awareness sessions and screening programs.

Figure 19: Project Staff conducting Door-to-door Survey

5. Registration and Informed Consent Procedure

All eligible participants were given necessary information regarding the program and were invited to attend the awareness and screening camps. Informed consent was obtained from those who were willing to participate in the program. The consent forms were made available in English and other vernacular languages such as Marathi and Hindi. A copy of the consent was provided to the participants.

Figure 20: Project staff conducting Registration and Informed Consent of Participants

6. Conducting Awareness Camps and Invitation

Project staff identified and arranged appropriate camp sites in the community. This was either community halls, religious institutions, schools or local clinics. The awareness sessions followed a structured sequence of activities delivered at designated community sites. Each camp began with registration, followed by a health awareness session led by trained social workers using flipcharts, calendar charts and other health education materials and printed materials. These sessions covered tobacco and alcohol-related risks, early signs of oral cancer and the importance of screening. After the education session, participants underwent risk factor assessment through a pre-structured questionnaire and they were invited to attend the screening camp.

Figure 21: Awareness sessions in the field

7. *Screening and Referral*

The screening and referral process was carried out in the community through selected camp sites. Following the registration and informed consent, participants were directed to the screening station where trained health workers performed oral visual inspection under adequate lighting using a good torch. A subset of participants was re-examined by the Medical Officer for quality assurance. Screening findings were documented on a digital platform using tablets with a pre-loaded web-based tool. Participants with suspicious lesions were marked as screen-positive and referred to the Tata Memorial Hospital for further evaluation. Referral slips were issued and the referral list was shared with the hospital coordination team. Follow-up was conducted through phone calls and in-person visits to ensure continuum of care.

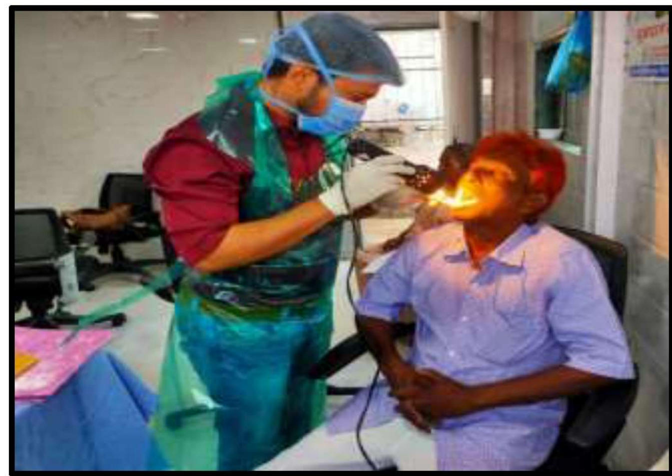


Figure 16: Screening by Medical Officer Picture

Figure 23: Re-examination by Faculty/Medical Professional for Quality Assurance

8. *Linkage to Diagnostic and Treatment Facility*

After a participant was identified as screen-positive, he was referred for evaluation at the Tata Memorial Hospital. After reporting to the hospital, participants had to undergo registration and a 'patient file' was made. They were examined by Medical Doctors. Depending on the findings, diagnostic procedures such as brush cytology or punch biopsy were conducted. Results were reviewed and individuals diagnosed with precancerous or cancerous lesions were planned for further management and treatment. Tobacco users were also linked to the Tobacco Cessation Clinic for intervention. Follow-up was maintained to ensure completion of diagnosis and initiation of appropriate care.

Figure 24: Registration Procedures at Nodal Hospital

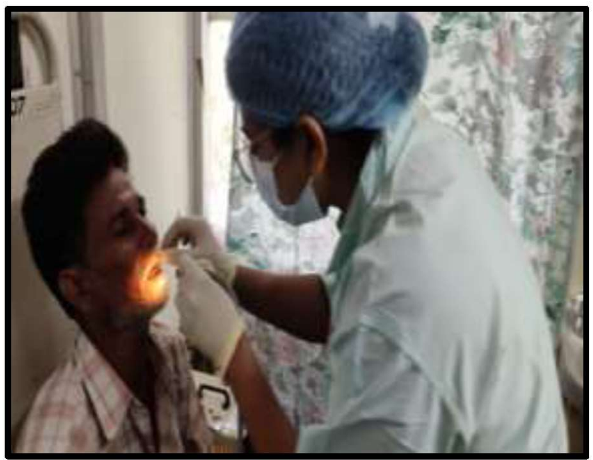


Figure 25: Evaluation of Referred Participants at Nodal Hospital

9. Tobacco Cessation Services

Initially, all enrolled beneficiaries received a detailed health awareness session on the hazards of tobacco and alcohol use. This was followed by the recording of the history of tobacco use, filling of questionnaires and risk factor assessment. Tobacco Cessation Counselling (TCC) was provided to all the participants at the camp site.

Following tobacco cessation counselling at the camp site all tobacco users were referred for tobacco cessation interventions to the Tobacco Cessation Clinic in the Department of Preventive Oncology at TMH. The stages for tobacco cessation were assessed in 6 stages. The distribution of stages for tobacco cessation is outlined as follows:

- ***The pre-contemplation stage*** - where individuals were not considering quitting.
- ***The contemplation stage*** - where they started to think about quitting.
- ***The preparation stage*** - where they actively planned for cessation.
- ***The action stage*** - where they made actual attempt to quit.
- ***The maintenance stage*** - where they worked on sustaining their tobacco-free lifestyle.
- ***The relapse stage*** - involved a return to tobacco use after a period of abstinence.

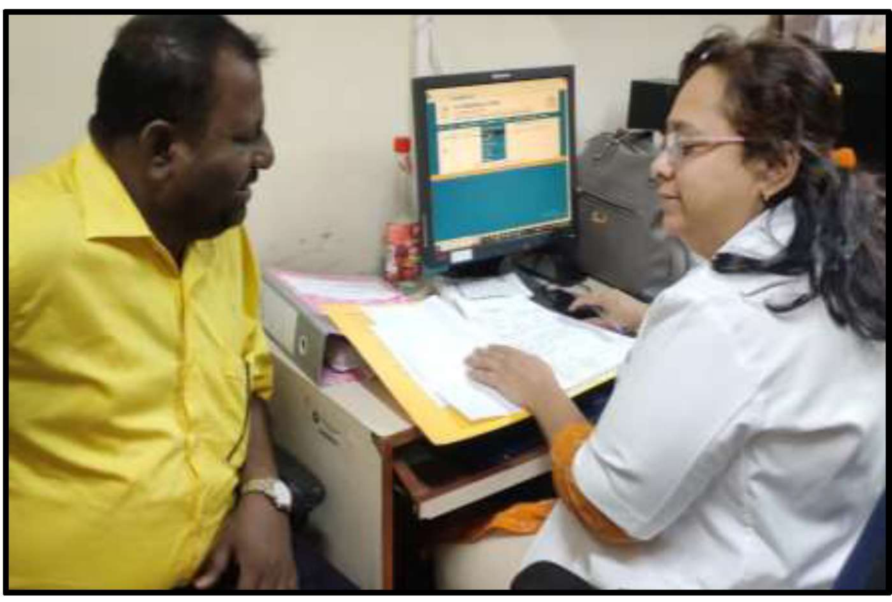


Figure 26: Tobacco Cessation Counselling (TCC) at Nodal Hospital

10.Monitoring and Evaluation

Monitoring and evaluation were integrated into daily field operations using digital data entry on tablets, allowing periodic tracking of registration, screening and referrals. Supervisors reviewed camp outputs and addressed discrepancies on-site. At the institutional level, data were compiled centrally and analysed to track key indicators. Referral follow-up and treatment status were maintained through a central register. Quarterly reports ensured regular review and informed adjustments to implementation.

Figure 27 : Photographs from Project Meetings

Operational Framework

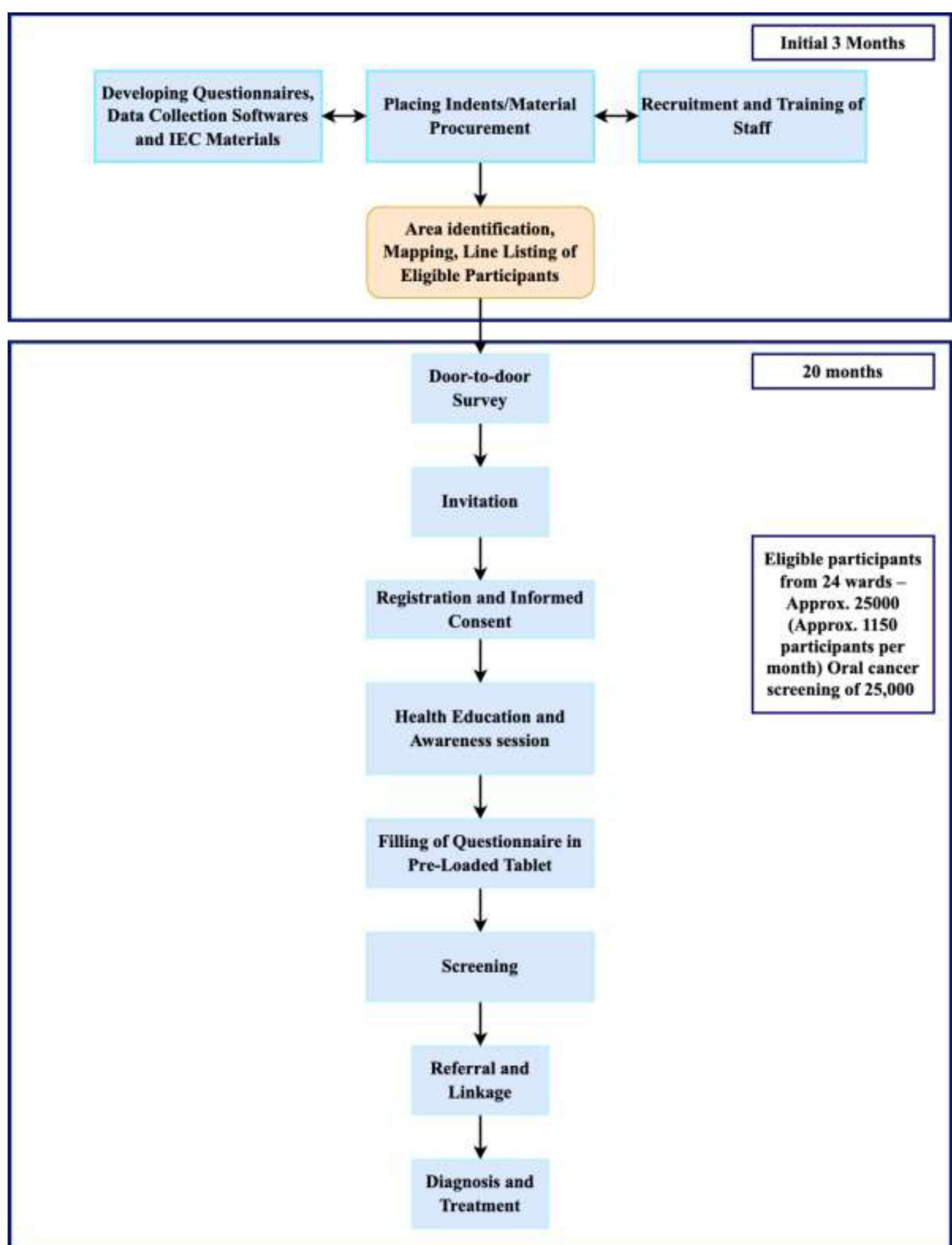


Figure 28: Operational Framework

Outcomes

1. Ward-wise distribution of participants

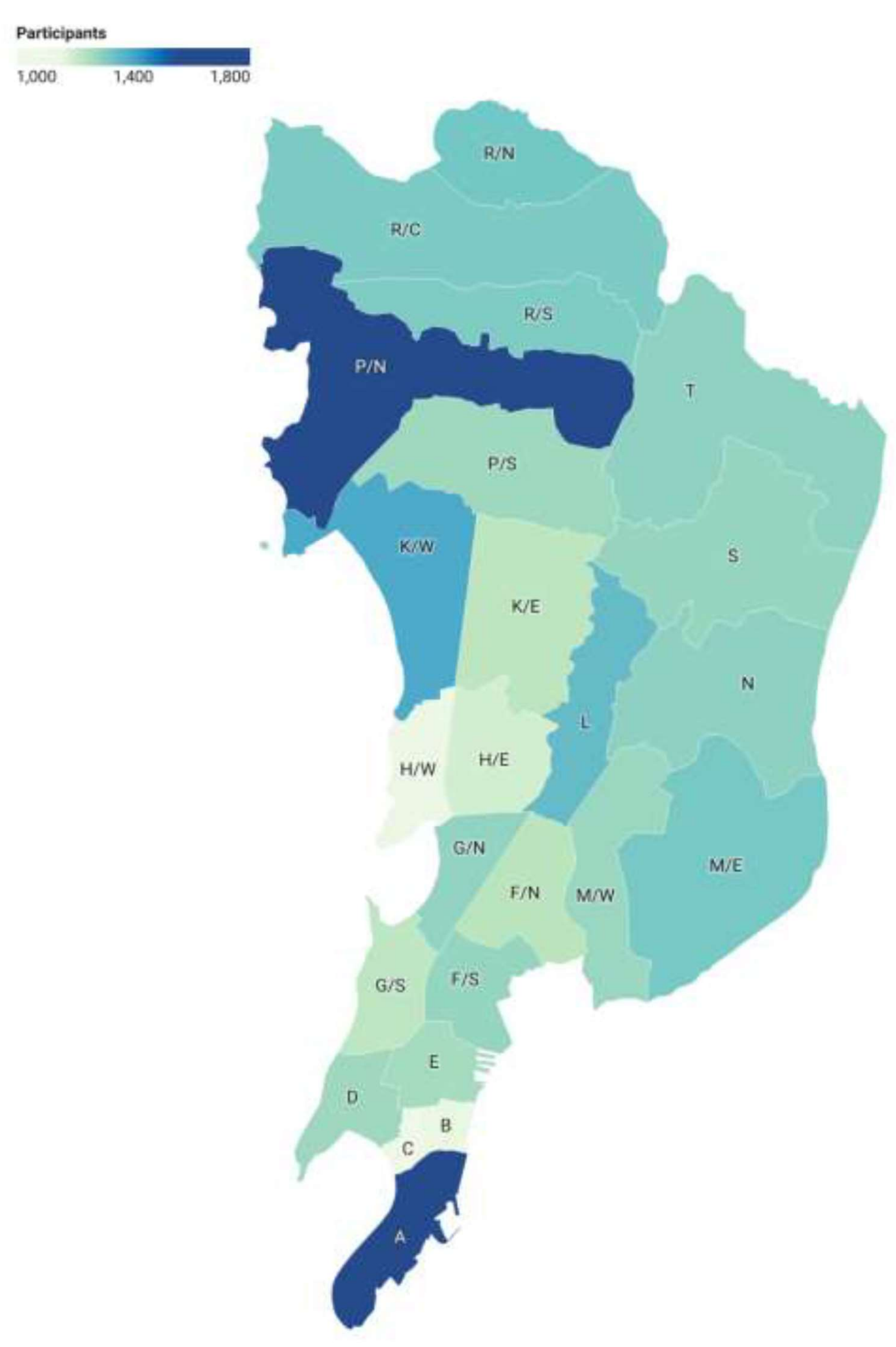


Figure 29: Heat map of 25 wards of BMC, showing Distribution of Participants

Table 2: Distribution of Participants across Wards of Mumbai

Wards	Male	Female	Total
A	761	791	1552
B	1012	144	1156
C	1050	96	1146
D	1064	207	1271
E	1041	221	1262
FN	1043	189	1232
FS	1069	214	1283
GN	1045	243	1288
GS	947	275	1222
HE	1017	176	1193
HW	924	228	1152
KE	1024	201	1225
KW	1018	377	1395
L	1053	299	1352
ME	1056	262	1318
MW	1008	270	1278
N	1004	289	1293
PN	1625	621	2246
PS	1002	270	1272
RC	1039	273	1312
RN	1033	291	1324
RS	1063	247	1310
S	1044	237	1281
T	1049	241	1290

2. Socio-demographic details

The majority of the participants were male, middle-aged and belonged to low socio-economic households. Most of them were Manual Labourers working on a daily wage basis.

Table 3: Participant Demographics

S.NO	Characteristic	N = 25,018
1.	**Gender**	
	Male	21,291 (85.10%)
	Female	3,727 (14.90%)
2.	**Age (in years)**	
	Mean ± SD	42.35 ± 14.630
	(Min, Max)	(18, 97)
3.	**Occupation**	
	Unemployed	845 (3.38%)
	Manual Labour	16,322 (65.24%)
	Housewife	2,221 (8.88%)
	Service	2,177 (8.70%)
	Self Employed	2,023 (8.09%)
	Retired	1,302 (5.20%)
	Other	128 (0.51%)
5.	**Monthly family income (in Rs.)**	
	Less Than Rs.20,000	24,262 (96.98%)
	Above Rs.20,000	756 (3.02%)

3. Baseline behaviours and tobacco use

The baseline data showed that less than 5% of the participants had heard of any tobacco cessation services. The exposure to awareness and screening services was only 0.34%.

Table 4: Exposure to Cancer Awareness/Screening

Exposure to Cancer Prevention Programs	N (%)
Heard of any Tobacco Cessation Services	547 (2.18%)
Past exposure to any cancer awareness program	85 (0.34%)
Past Cancer Screening History	85 (0.34%)

Table 5: Type of Tobacco used

Khaini was the most common form of tobacco consumed by the participants, followed by Gutka and cigarettes.

Characteristic	**N = 24,973**
Cigarette	4,080 (16.34%)
Beedi	1,957 (7.84%)
Hookah	157 (0.63%)
Other Smoking forms	190 (0.76%)
Khaini/Zarda/Tobacco in Chewing forms	11,004 (44.06%)
Pan with Tobacco	2,751 (11.02%)
Pan without Tobacco	602 (2.41%)
Gutka	8,819 (35.31%)
Mawa	602 (2.411%)
Masheri	2,330 (9.33%)
Betel Nuts	634 (2.539%)
Other Smokeless forms	150 (0.600%)

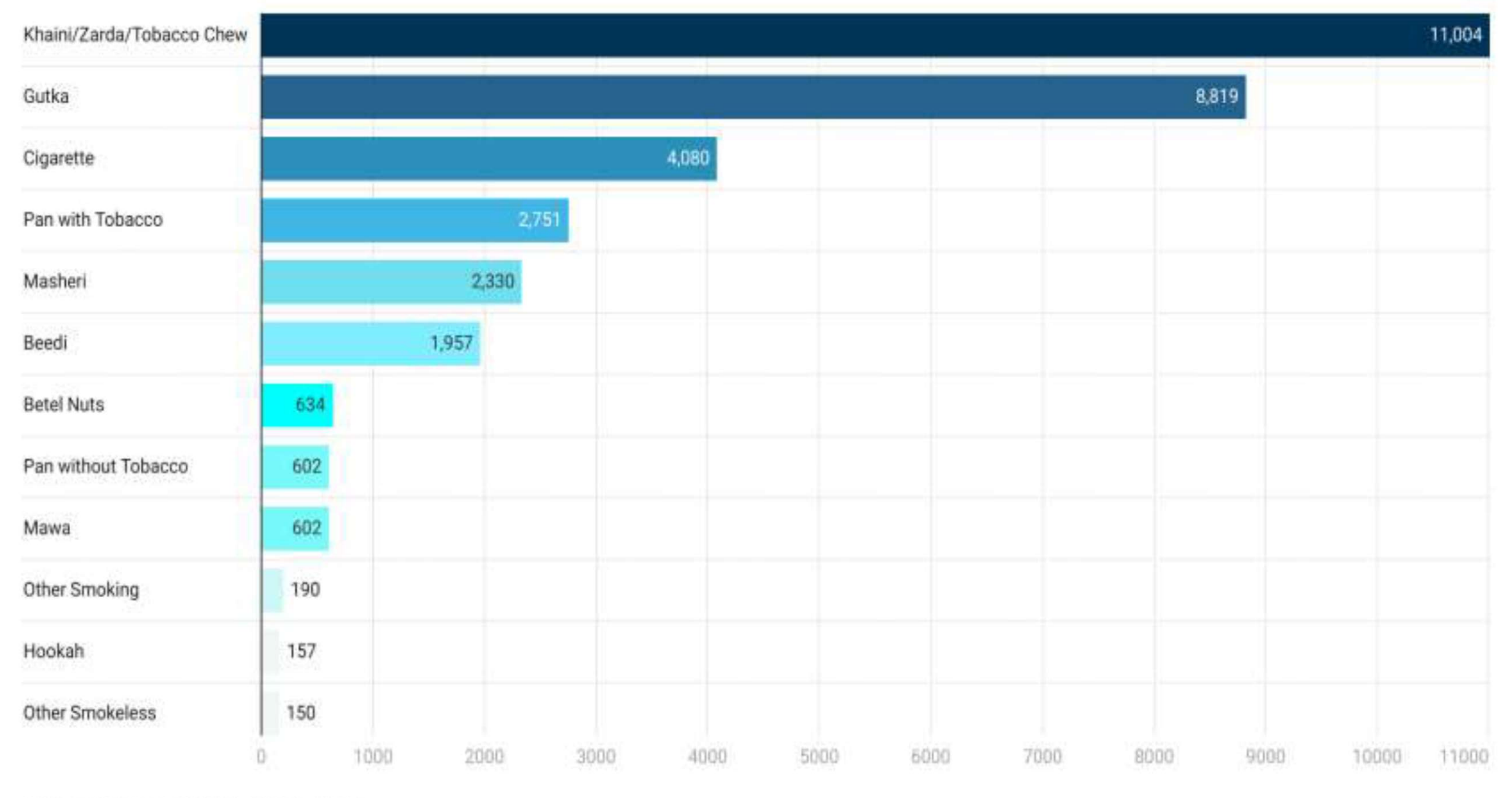


Figure 30:Type of Tobacco Used by Participants

4. Lesions Detected in Screening

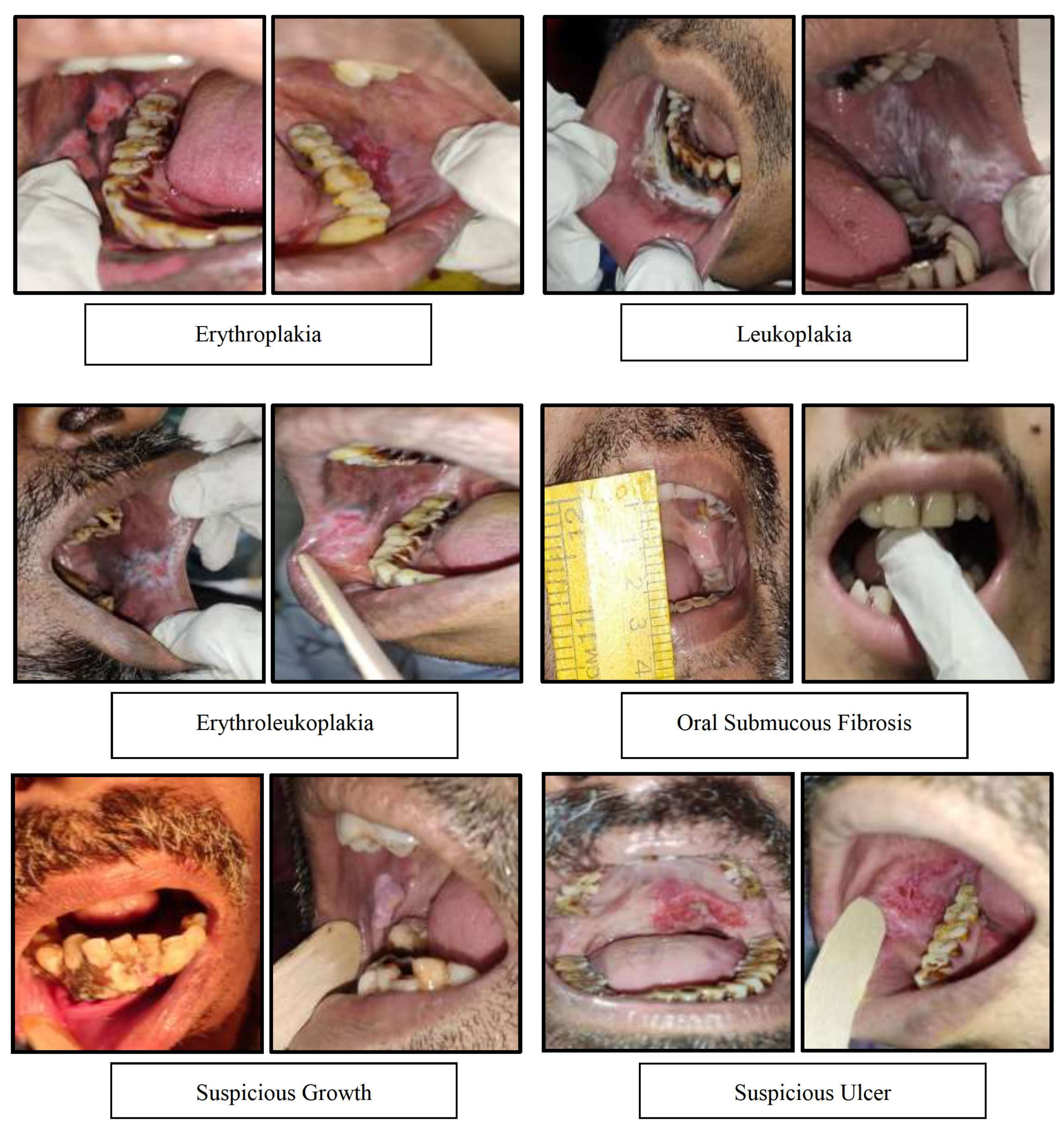


Figure 31: Photographs of the Different Lesions Detected

5. Screening program Indicators

a. Participation Rate (%)

(Number of people screened ÷ Invited population) × 100

Table 6: Participation Rate

Invited	Screened
31653	**25018**

Participation rate = **79.04 %**

b. Compliance to diagnostic referral (%)

(Number who completed diagnostic follow-up ÷ Number of screen-positives) × 100

Table 7: Compliance to Diagnostic Referral

Screen-Positive	Attended at Nodal hospital
1875	**1551**

Compliance to diagnostic referral (%) = **82.72**

c. Positivity rate

(Number of screen-positives ÷ Number screened) × 100

Table 8: Positivity Rate

Screened	Screen-positive
25018	**1875**

Positivity rate = **7.49%**

d. Cancer detection rate (per 1,000)

(Number of cancers detected ÷ Number screened) × 1,000

Table 9: Cancer detection rate

Screened	Cancer
25018	**18**

Cancer detection rate (per 1,000) = **0.72**

e. Detection rate of precancerous lesions (per 1,000)

(Number of pre-cancers detected ÷ Number screened) × 1,000

Table 10: Detection rate of precancer lesions

Screened	Precancers Detected
25018	**1562**

Detection rate of precancerous lesions (per 1,000) = **62.44**

f. Positive Predictive Value (PPV)

(Number of true positives [pre-cancer] ÷ Number of screen-positives) × 100

Table 11: Positive Predictive Value

Screen Positives	Precancers / Cancers Detected
1875	**1562 + 18**

Positive predictive value (PPV) = **84.26%**

Innovations

TMH, with funding support from Watumull Sanatorium Trust, designed an atlas titled "Atlas of Oral Precancerous Lesions and Oral Cavity Cancers- A Practical Guide for Training of Paramedical Staff. This atlas primarily focuses on familiarising Auxiliary Nurse Midwifery (ANMs), Public Health workers (PHWs), Community Health Volunteers (CHVs), Paramedical Staff and Doctors from Maharashtra State Health Services in the identification of oral precancerous lesions and conditions. It is intended to be used as training and initial teaching material. This pictorial atlas is a compilation of intraoral precancerous lesions and conditions identified during the implementation of an awareness and screening programme and will serve as a pictorial guide for clinical identification of pre-cancers and cancers. This booklet was launched on the occasion of World Cancer Day, 04th February 2025, at Arogyabhavan, Mumbai.

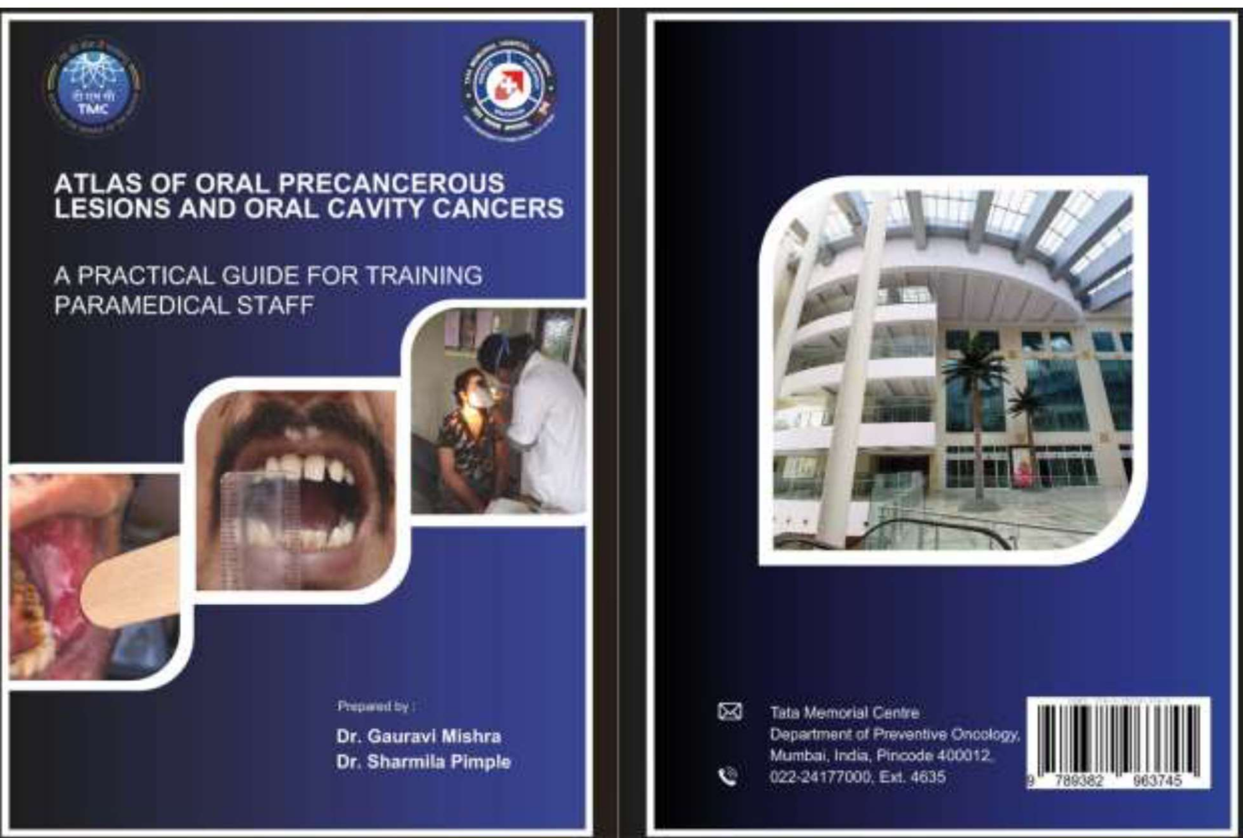


Figure 32: Atlas of Oral Precancerous Lesions and Oral Cavity Cancers

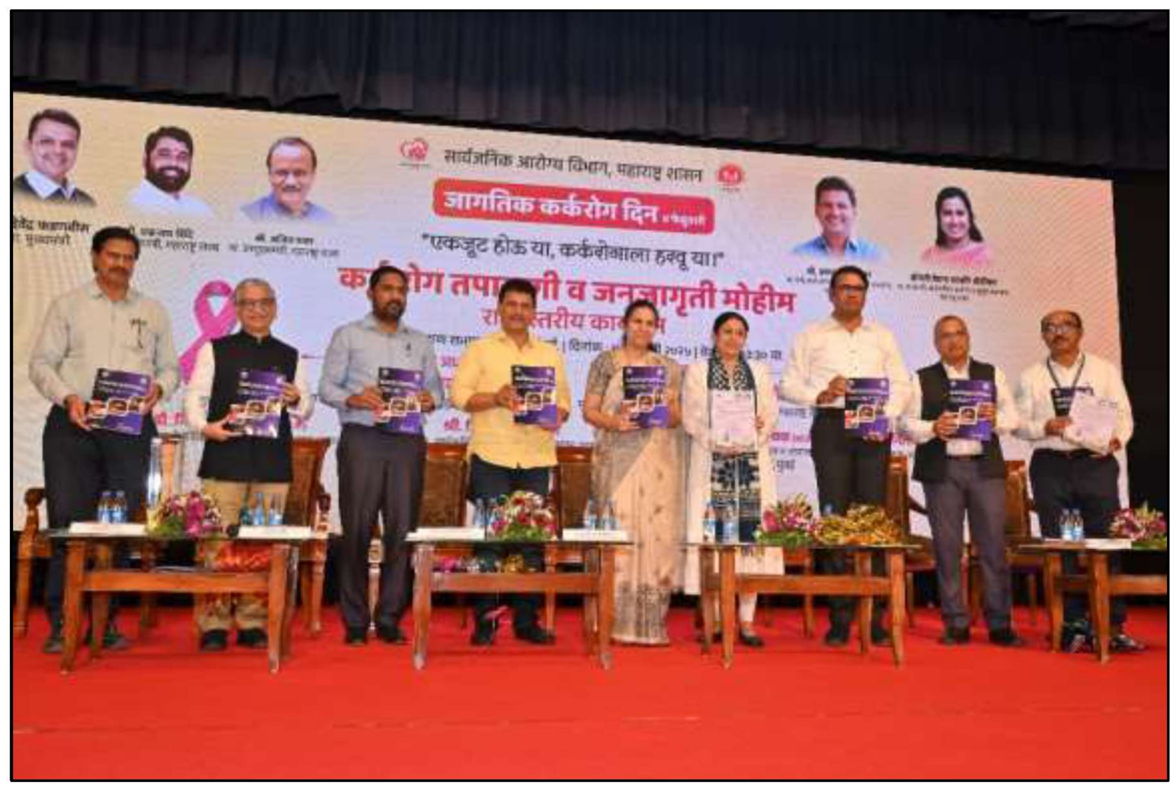


Figure 33: Release of Atlas of Oral Precancerous Lesions and Oral Cavity Cancers

Additional Project Activities

Figure 34: Oral Cancer Awareness Camp on Occasion of International Women's Day, 2023

Figure 35: Oral Cancer Awareness Camp on Occasion of World No Tobacco Day, 2023

Figure 36: KEVAT Observers Visiting Camp Place

Figure 37: Study Presented at 6th NCTOH, Delhi

Facilitators

1. Fail-Safe Mechanisms for Continuum of Care

- **Referral Slip Issuance:**

  Every screen-positive participant received a physical referral slip during the camp, detailing the date, location and instructions for reporting to Tata Memorial Hospital.

- **Referral List Forwarding:**

  A compiled list of all referred participants was electronically shared with the project health assistant, who acted as a Navigator at TMH for pre-arrival coordination.

- **Dedicated Follow-Up Team:**

  Health workers and social workers were assigned to follow up with screen-positive participants via phone and in person to ensure they attended the hospital visit.

- **Hospital-Based Navigation Support:**

  A project-specific team at TMH facilitated participant registration, guided them through the OPD process and coordinated diagnostic appointments.

- **Tracking Register:**

  A centralised digital tracking register was maintained to monitor the referral status, diagnostic completion and treatment initiation of each referred participant.

- **Missed Referral Follow-Up:**

  Participants who did not report within a defined timeframe were re-contacted by the team to reschedule and support re-engagement.

- **Integrated Tobacco Cessation Referral:**

  All tobacco users identified during screening were also referred to the Tobacco Cessation Clinic at TMH and their attendance and intervention uptake were recorded

2. Dynamic Planning

Dynamic planning played a critical role in adapting the project to the field realities of working in diverse low-resource urban settings across Mumbai. Camp schedules and locations were regularly adjusted based on community responsiveness, participant footfall and local logistical constraints. Staffing arrangements were modified in response to variations in camp load and additional resources were deployed to high-volume sites. Feedback from field staff and participants was reviewed on a rolling basis, allowing immediate changes to workflow, camp setup and data collection procedures. Changes in public holidays, local events, or ward-level restrictions were factored into real-time scheduling decisions. Dynamic planning also supported the reallocation of follow-up teams based on referral compliance trends, ensuring timely navigation of screen-positive participants to diagnostic services. This flexible, responsive approach enabled the project to maintain service continuity and operational efficiency across all 25 wards.

3. Leadership

The project was driven by a collaborative and adaptive leadership style, which enabled coordinated execution across multiple stakeholders and settings. Senior faculty from the Department of Preventive Oncology at the Centre for Cancer Epidemiology at Tata Memorial Centre led the initiative with a focus on shared decision-making, regular team engagement and responsiveness to ground-level inputs. This leadership approach promoted interdepartmental coordination, timely approvals and open communication with field teams, enhancing problem-solving and operational flexibility. Regular feedback loops, inclusive planning and on-site supervision empowered mid-level staff and ensured consistent adherence to protocols. The leadership team maintained institutional alignment, facilitated community and political engagement and ensured continuity of care by reinforcing the referral and diagnostic linkages throughout the project.

4. Dashboard and Web-Based Periodic Monitoring

The project incorporated a web-based digital platform developed with help from the TMH IT Department. It enabled periodic monitoring of field activities. Data from registration, screening and referrals were entered on-site using tablets, enabling live tracking of key indicators through a centralised dashboard. This allowed immediate visibility into camp performance, referral compliance and follow-up status. Supervisors used the dashboard to identify gaps, reassign resources and ensure timely interventions. The system enhanced data accuracy, reduced manual errors and streamlined reporting, supporting efficient management across all operational levels.

Barriers

- Substance use among participants: Routine tobacco or alcohol consumption impacted both attendance and the quality of participation.
- Financial constraints: Limited resources hindered participants from accessing or prioritising screening.
- High-risk individuals: Behavioural issues in this group posed additional challenges for engagement.
- Logistical challenges during camps:
    - Poor hygiene conditions in some areas
    - Inconsistent electricity and water supply
    - Disruptions due to heavy rainfall
- Low perceived threat in the community: A general sense of low susceptibility to oral cancer reduced the perceived need for screening.

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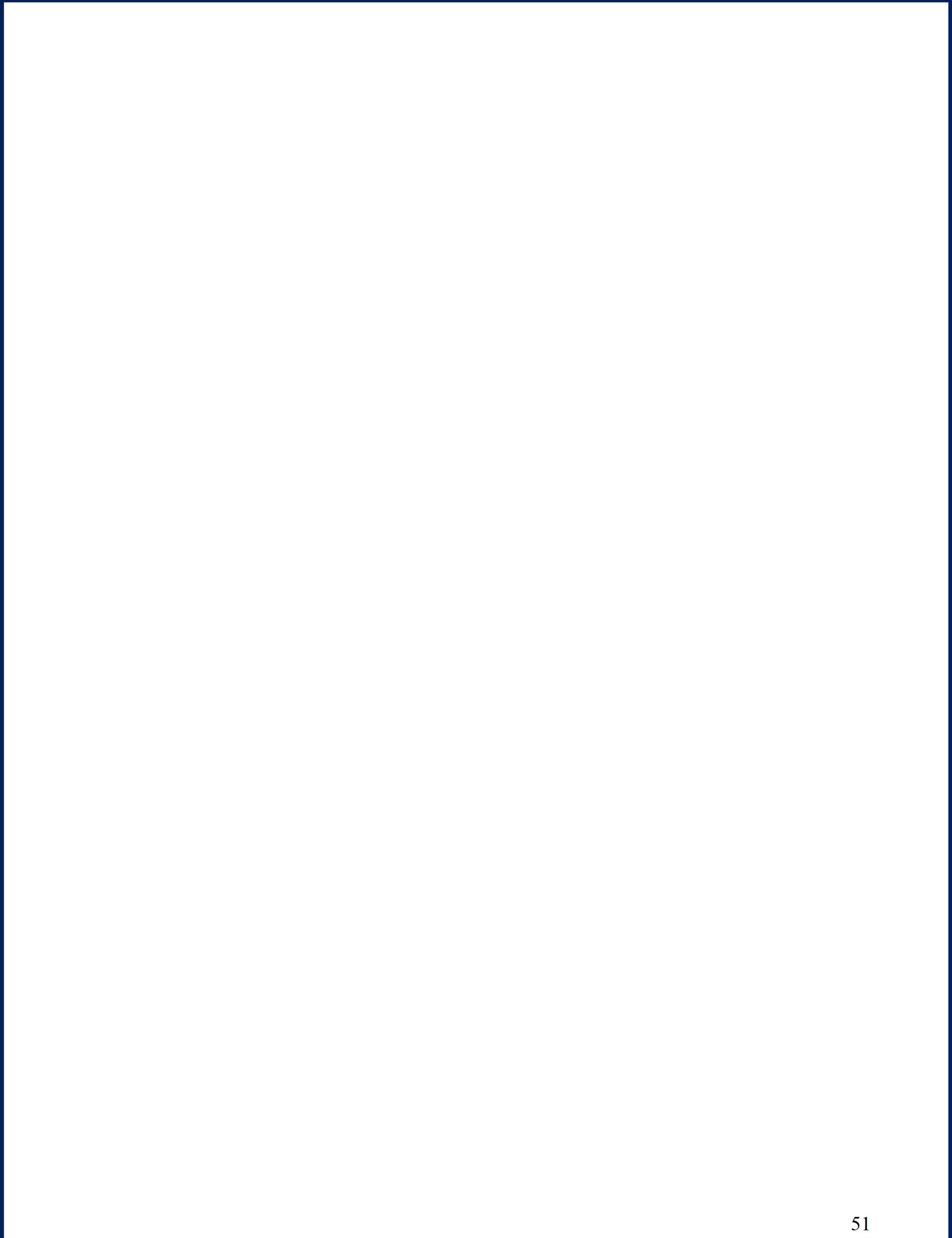

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