Dated: 10.10.2025

Organization Name (Please provide the Legal Name of the Organization): All India Institute of Medical Sciences, Delhi

Address: Ansari Nagar, New delhi-29

City: New Delhi

State: Not Applicable

Zip: 110029

Country: India

Website address: http://www.aiims.edu

Executive Director/CEO: Dr. M. Srinivas

Primary Contact Name (Please provide the full name of the Primary Contract (first name, last name): Abhishek Shankar

Primary Contact Title: A/P

Primary Contact Phone Number: 9968721213

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Primary Contact Email Address: doc.abhishankar@gmail.com, drabhishek@aiims.gov.in

Name of Contract Signatory: Abhishek Shankar

Contract Signatory Title: Dr.

Contract Signatory email: doc.abhishankar@gmail.com

Is your organization a non-profit or non-governmental organization (NGO)?: **Non-profit**

What designation is your nonprofit? (2000 Character):

All India Institute of Medical Sciences, New Delhi (AIIMS New Delhi), is a public medical research university and hospital in New Delhi, India. The institute is governed by the AIIMS Act, 1956 and operates autonomously under the Ministry of Health and Family Welfare. All-India Institute of Medical Sciences was established as an institution of national importance by an Act of Parliament with the objects to develop patterns of teaching in Undergraduate and Post-

graduate Medical Education in all its branches so as to demonstrate a high standard of Medical Education in India; to bring together in one place educational facilities of the highest order for the training of personnel in all important branches of health activity; and to attain self-sufficiency in Post-graduate Medical Education.

The Institute has comprehensive facilities for teaching, research and patient-care. As provided in the Act, AIIMS conducts teaching programs in medical and para-medical courses both at undergraduate and postgraduate levels and awards its own degrees. Teaching and research are conducted in 42 disciplines. In the field of medical research AIIMS is the lead, having more than 1000 research publications by its faculty and researchers in a year. AIIMS also runs a College of Nursing and trains students for B.Sc. (Hons.) Nursing post-certificate) degrees.

Twenty-five clinical departments including four super specialty centers manage practically all types of disease conditions with support from pre- and Para-clinical departments. AIIMS also manages a 60-beded hospital in the Comprehensive Rural Health Centre at Ballabgarh in Haryana and provides health cover to about 2.5 lakh population through the Centre for Community Medicine**.**

Documentation of Organization Type (Accepted documentation includes: W9, Non-Profit Organization certification, Cadastro Nacional de Pessoa Juridica Document, Permanent Account Number Card copy, Good and Services Tax Certificate/Exemption, and/or Memorandum of Association): **GSTN certificate**

Tax ID number of Organization:

Organization’s Total Annual Operating Budget (List your organization's total operating budget. Please note that the BMS Foundation’s annual payment should not exceed 30% of the organization’s current annual operating budget):600 million USD (approx..) for financial year 2025-26

Organization Funding Documentation: Government of India budget allocation

Project Title (**Please provide a title for your project. This title will be used as the referencing name for this request moving forward on all BMS Foundation documents):** **AIRCARE** (Air Pollution and Cancer Research Ecosystem): Center for Advanced Research on Environmental Health and Lung Cancer Risk

Request Start Date: 01.09.2025

Request End Date: 31.08.2028

Brief Description of Applying Organization (Please describe the applying organization, mission, history of relevant work/experience to improve global public health, and how the organization has demonstrated the ability to execute the proposed project) (2500 Character):

In alignment with its vision to bridge gaps in evidence-based care and population-level disease prevention, AIIMS will be the best institute for the establishment of AIRCARE (Air Pollution and Cancer Research Ecosystem): a Center for Advanced Research on Environmental Health and Lung Cancer Risk. The center will serve as a flagship initiative to investigate the complex interplay between environmental exposures and cancer epidemiology, focusing particularly on PM2.5-related lung cancer burden in India.

AIIMS has previously led successful national and global collaborations including the India State-Level Disease Burden Initiative, the National Cancer Grid, and WHO-partnered tobacco control programs leveraging its multidisciplinary faculty with expertise in oncology, epidemiology, environmental health, and public health. These experiences underscore the institution's capability to generate high-impact data and translate it into action.

Through AIRCARE, AIIMS aims to assess the causal relationship between long-term PM2.5 exposure and lung cancer risk, explore interactions with behavioral and genetic risk factors, and develop a validated, risk-based stratification model to inform lung cancer screening in high-risk populations. The center will also spearhead biomarker discovery initiatives to identify early biological signatures of PM2.5-induced carcinogenesis along with identifying vulnerable groups disproportionately affected by air pollution.

AIIMS is uniquely positioned to lead this transformative initiative that aims to bridge science, and policy gaps to mitigate environmental health risks in India and the Global South with its

institutional infrastructure, state-of-the-art research facilities, and a strong commitment to equitable health.

Partners (Please list all collaborating partners, if relevant, and specific roles and responsibilities for each partner. If any memorandums of understanding (MOUs) have been signed, please attach in the "Attachments" section at the end of the application) (32500 character):

The proposed AIRCARE (Air Pollution and Cancer Research Ecosystem): Center for Advanced Research on Environmental Health and Lung Cancer Risk, will establish a robust framework for interdisciplinary and interinstitutional collaboration. Departments of Radiation Oncology, Medical Oncology, Surgical Oncology, Onco-Anesthesia and Palliative Medicine, Pulmonary Medicine and Biostatistics will integrate efforts to provide comprehensive care and research expertise. A centralized data management system will ensure seamless coordination between clinical, laboratory and other required domains. Regular interdisciplinary meetings, standardized protocols, and advanced biostatistical support will streamline the implementation of complex, multi-domain studies to improve the understanding of emerging risk factors of Air pollution for lung cancer and its prevention and screening.

The Department of Radiation Oncology will be involved with patient screening, examination, diagnosis, enrolment and treatment along with follow-up and data gathering.

The Department of Medical Oncology will be involved with patient screening, examination, diagnosis, enrolment and treatment along with follow-up and data gathering.

The Department of Surgical Oncology will be involved with patient screening, examination, diagnosis, enrolment and treatment along with follow-up and data gathering.

The Department of Onco-Anaesthesia and Palliative Medicine will be involved with patient screening, examination, diagnosis, enrolment and treatment along with follow-up and data gathering.

The Department of Pulmonary Medicine will be involved with patient screening, examination, diagnosis, enrolment and treatment along with follow-up and data gathering.

The Department of Biostatistics will be responsible for evaluating the gathered data and providing inputs on the progress of the project based on statistical modelling.

Executive Summary (Provide a one-sentence summary of the project concept) (32500 character):

AIRCARE aims to establish a centre for advanced research to study the long-term effects of chronic exposure to air pollutants and their cumulative contribution to lung cancer risk.

Program Summary (Provide an overview of the project. Include the proposed intervention, the care gap/health disparity that is being addressed, the project's target population (target geography, disease burden, needs of the target population, and number of patients you expect to serve through this project) (2000 character):

In India, lung cancer is the 2nd most common in males and 4th overall in cancer incidence with 81,784 new cases and 75,031 deaths with a 5-year prevalence of 1,13,990 as per GLOBOCAN 2022Air pollution, particularly fine particulate matter (PM2.5), has been identified as a significant risk factor for lung cancer in never-smokers. India is showing an increasing incidence of lung cancer and there is a need to understand air pollution given many cities in India have been reported to be the most polluted in the world. Evidence of causal associations between PM2.5 and an increased likelihood of lung cancer with underlying biological mechanisms are now fully known. Current evidence focuses on individual pollutants, overlooking potential interactions among multiple risk factors that could amplify lung cancer risks. There is paucity of data on vulnerability of groups like children, older adults, and individuals with pre-existing health conditions, who may face disproportionate risks from poor air quality. The long-term effects of chronic exposure to air pollutants and their cumulative contribution to lung cancer risk remain understudied. Centre for Advanced Research on AIRCARE is essential to bridge these research gaps, providing a holistic understanding of air pollution's role in lung cancer to plan prevention and policy strategies. The study will be conducted at AIIMS, Delhi, and areas in Delhi and NCR with varying levels of PM 2.5 exposure and will encompass regions with diverse socio-economic profiles and industrial activities to capture the heterogeneity of exposure and risk. 3230 subjects will be enrolled, based on different pollution levels and demographic subgroups. Controls will be randomly selected from the cohort and matched to cases on age (±3 years), sex, and residential area. A subset of the

cohort will be selected for genotyping, focusing on individuals with extreme exposure levels and/or lung cancer cases and controls for genetic interaction studies.

Project Goals (lease list the identified goals of your proposed project) (32500 character):

1. To investigate the relationship between PM 2.5 and lung cancer risk, focusing on individual and cumulative effects along with the multiplicative interaction of air pollution with other risk factors for lung cancer.

Methodology -

Study Design

A combination of a prospective cohort study and case-control study will be employed. The prospective cohort will establish the temporal relationship between air pollution exposure and lung cancer incidence. The case-control study will facilitate detailed exposure assessment and biomarker analysis within a subset of the cohort. The case-control design will also be utilized to further explore gene-environment interactions and detailed exposure assessments. Prospective and retrospective data from existing patient records, environmental monitoring stations, and the cohort will be used. The clinical workup of the enrolled participants will be done according to a standardised proforma (attached in additional documents) which will contain items relating to participant demographics, work and exposure history, medical history, tobacco history, alcohol history, family history, allergy history, prior history of chronic medical conditions and history pertaining to the nonsurgical treatment of chronic medical conditions.

In a longitudinal cohort, participants will be followed over 3 years, with repeated exposure assessments and health outcome monitoring. Lung cancer cases diagnosed within the cohort will be matched to controls based on age, sex, and residential area.

Study area

The study will be conducted at AIIMS, Delhi, and areas in Delhi and NCR with varying levels of PM 2.5 exposure and will encompass regions with diverse socio-economic profiles and industrial activities to capture the heterogeneity of exposure and risk.

The study will be conducted within the same geographical areas as the overall AIRCARE cohort study, encompassing diverse urban and peri-urban regions. The study area will have varying levels of air pollution (PM2.5, VOCs, NOx) and a diverse distribution of other risk factors (smoking, occupational exposures, genetic susceptibility) in Delhi and NCR with established air quality monitoring infrastructure, and different socioeconomic profiles.

Sample size estimation and sampling strategy

Power calculations will be performed to determine the required sample size to detect a clinically significant increase in lung cancer risk associated with air pollution exposure. Assuming an average prevalence of lung cancer of 1.5% in India and odds of at least 2 times for high PM-2.5 exposure above the normal range (>37 μg/m^3,) and an alpha level of 0.05 with 80% power, we estimate enrolling approximately 3230 participants (1615 lung cancer cases and 1615 controls). We will use the diagnosed lung cancer cases from outpatient department and Delhi cancer registry (DCR) and control will be recruited from the family members of lung cancer patients to get the matched population in terms of PM 2.5 exposure.

Project Implementation Plan

Cases will include patients with lung cancer (smokers and non-smokers), taken from OPD and from DCR data set. Control will be family members of patients with lung cancer (smokers and non-smokers).

The primary outcome will be measured in terms of histologically confirmed incidence of lung cancer. The interaction effects between air pollution (PM2.5) and other risk factors (smoking, Alcohol consumption, occupational exposures, genetic susceptibility) on lung cancer incidence and cumulative risk of lung cancer associated with combined exposure to air pollution and other risk factors will be evaluated.

Secondary Outcomes will be measured with the impact of interaction effects on lung cancer histological subtypes, modification of lung cancer risk by genetic variants in the presence of air pollution exposure, changes in biomarker profiles associated with combined exposures, and synergistic effects of PM 2.5 and other risk factors.

Design of statistical analysis

Ambient air pollution exposure will be quantified using a combination of satellite data, ground-based monitoring, and individual exposure measurements with a measure of PM2.5 concentration.

For the cohort study, cox proportional hazards models will be used to estimate hazard ratios (HRs) for lung cancer incidence and mortality associated with air pollution exposure. Time-dependent covariates will be included to account for changes in exposure over time. Survival analysis (Kaplan-Meier method) will be used to examine survival outcomes.

For the case-control study, logistic regression will be used to estimate odds ratios (ORs) for lung cancer associated with detailed exposure assessments and biomarker levels. Analysis of the interaction between pollutants will be performed using interaction terms in the regression models. Sensitivity analyses will be conducted to assess the robustness of the findings to potential confounding factors and exposure misclassification. Dose-response relationships between PM 2.5 exposure and lung cancer risk will be examined using categorical and continuous exposure variables. Subgroup analyses will be conducted to examine the effect of air pollution on lung cancer risk in different demographic subgroups (e.g., age, sex, smoking status).

2. To develop and validate a risk-based stratification model based on PM-2.5 exposure for lung cancer screening.

Study Design

This objective will involve development and validation phases. In the development Phase, we will utilize a retrospective cohort or a prospective cohort dataset, to develop a risk prediction model. This process will use existing data from the ongoing cohort study, or historical data from cancer registries and air quality monitoring stations. The developed model will be externally validated using an independent dataset from a geographically distinct population. This will have a new cohort or a separate dataset, that will be enrolled for prospective validation.

Study area

This will be conducted at AIIMS, Delhi, and areas with a diverse range of PM2.5 exposure levels in Delhi and NCR. We will require a geographically distinct region, within India, with independent data on PM2.5 exposure and lung cancer incidence for validation purposes. This

region will have demographic and environmental characteristics that differ from the area being studied for lung cancer development, to ensure external validity.

Sample size estimation and sampling strategy

For model development, the sample size will be determined based on the number of lung cancer cases and controls available in the retrospective/prospective datasets. Assuming an average prevalence of lung cancer of 1.5% in India and odds of at least 2 times for high PM-2.5 exposure above the normal range (>37 μg/m^3,) and an alpha level of 0.05 with 80% power, we estimate enrolling approximately 3230 participants (1615 lung cancer cases and 1615 controls).

Sampling Strategy:

For model development, patients with lung cancer at Dr BR Ambedkar Institute Rotary Cancer Hospital at AIIMS, Delhi and Delhi cancer registry data will be used.

Project Implementation Plan

The primary outcome will be measured based on the performance of the risk stratification model in predicting lung cancer risk, assessed by area under the receiver operating characteristic (AUROC) curve, sensitivity and specificity at predefined risk thresholds, and using calibration plots, to assess the agreement between predicted and observed risks.

The secondary Outcomes will be measured in terms of the positive predictive value (PPV) and negative predictive value (NPV) of the model, the impact of the model on lung cancer detection rates and stage distribution, and the model's ability to correctly categorize risk in prespecified subgroups.

Design of statistical analysis

In model development phases, logistic regression or machine learning algorithms (e.g., random forests, gradient boosting) will be used to identify predictors of lung cancer risk, including PM2.5 exposure, demographic factors, and other relevant variables. A risk prediction model will be developed using the selected predictors. The model's performance will be evaluated using internal validation techniques, such as bootstrapping.

The developed model will be applied to the independent validation dataset. The model's performance will be assessed by calculating the AUROC, sensitivity, specificity, PPV, and NPV. Calibration plots will be generated to visually assess the agreement between predicted and observed risks. Decision curve analysis will be conducted to evaluate the clinical utility of the model. The model's performance will be assessed in predefined subgroups, such as age, sex,

and smoking status. The performance of the PM2.5-based model will be compared with existing lung cancer screening guidelines.

the findings to potential confounding factors and exposure misclassification. Statistical software packages such as R, SAS, and Python will be used for data analysis.

3. To identify biomarkers for PM 2.5-associated lung cancer.

Study Design

In this study, we aim to identify unique molecular signatures induced by PM2.5 exposure using next-generation sequencing (NGS). The two groups utilised in this study will be that of smokers and non-smokers. The logical assumption being that both groups have an exposure to PM 2.5. The rationale for the design is centred upon the fact that lung cancer specific biomarkers detected in the smokers group will primarily be attributable to smoking, however, those detected in the non-smoker group may help in identifying a novel signature induced by PM 2.5 in developing lung cancer.

Specifically, peripheral blood mononuclear cells (PBMCs) will be collected from both non-smokers and lung cancer patients to examine the impact of PM2.5 exposure. The PBMCs will be cultured in vitro, allowing for proper propagation before exposure to PM2.5 particles. For this experiment, PM2.5 will be sourced from the National Physical Laboratory. These fine particulate matter samples will be used to expose the cultured PBMCs to simulate real-world exposure conditions. After exposure, we will conduct targeted next-generation sequencing (NGS) to profile the transcriptomic changes within these cells. The key focus of this study is to identify differentially expressed genes (DEGs) triggered by PM2.5 exposure. The comparison will be made between the response of PBMCs from non-smokers and those from lung cancer patients. Mutations such as those pertaining to EGFR and ROS are known in literature to be associated with lung cancer. The approach being utilised in the present study design will allow for the generation of a distinct molecular signature associated with PM2.5 exposure, which may reveal specific genetic alterations or biomarkers relevant to both environmental exposure and lung cancer pathogenesis. The final objective is to develop a PM2.5-specific gene signature that could serve as a potential biomarker for exposure or disease progression. This study could provide crucial insights into how PM2.5 affects gene expression differently in healthy individuals and lung cancer patients, potentially contributing to our understanding of environmental influences on cancer development.

Study area

This will be done at the cancer center at AIIMS, Delhi, and will include the same geographical areas as the overall AIRCARE cohort study, with access to hospital facilities for lung cancer diagnosis and sample collection.

Sample size estimation and sampling strategy

Sample size will be taken based on feasibility using the above-mentioned cohorts. Peripheral blood samples from both non-smokers and lung cancer patients will be collected after ethical approval. PBMC isolation will be done and cell counting will be done using a hemocytometer or an automated cell counter. We will perform a cell viability assay using Trypan Blue or a similar reagent to ensure the viability is above 90%. PBMC culture will be set followed by PM 2.5 preparation and dispersion. PM 2.5 will be exposed to PBMCs. RNA from the collected PBMCs will be isolated using a reliable RNA extraction kit (e.g., Qiagen RNeasy Kit or similar). Targeted NGS will be performed. We will use appropriate bioinformatics tools to identify differentially expressed genes (DEGs) between the PM2.5-exposed and control groups and comparisons between the responses of PBMCs from non-smokers and lung cancer patients will be done to identify differences in gene expression. We will be able to generate PM 2.5 signatures after identifying genes that are consistently differentially expressed across both non-smokers and lung cancer patients.

Project Implementation Plan

Primary Outcome will be measured by identification of biomarkers that are significantly associated with air pollution-related lung cancer, and the predictive ability of the biomarkers to discern between cases and controls.

Secondary Outcomes will be measured in terms of the association between biomarker levels and air pollution exposure levels, temporal changes in biomarker levels associated with lung cancer development, association between biomarker levels and lung cancer histological subtypes, usefulness of biomarker panels for early lung cancer detection, and ability of the biomarkers to predict treatment response.

Design of statistical analysis

Differential expression analysis (e.g., t-tests, ANOVA) will be used to identify biomarkers that are differentially expressed between lung cancer cases and controls. Machine learning algorithms (e.g., random forests, support vector machines) will be used to identify biomarker panels that can accurately discriminate between cases and controls. Pathway analysis will be used to identify biological pathways associated with the identified biomarkers.

Receiver operating characteristic (ROC) curve analysis will be used to evaluate the diagnostic accuracy of the candidate biomarkers. Logistic regression will be used to assess the association between biomarker levels and lung cancer risk. Correlation analysis will be used to assess the association between biomarker levels and air pollution exposure. Mixed-effects models will be used to analyze longitudinal changes in biomarker levels. Survival analysis will be used to assess the association between longitudinal biomarker changes and lung cancer development. Statistical software packages such as R, Python (scikit-learn), and specialized bioinformatics tools will be used for data analysis.

4. To identify vulnerable populations and assess their susceptibility to air pollution-related lung cancer.

Study Design

This will primarily utilize the existing longitudinal cohort data members. A cross-sectional study will be conducted among the family members/relatives of high-risk or lung cancer patients cohort. This will see the patients with a family history, and with chronic lung conditions. Mixed-Methods approach will be used to assess the effectiveness of the interventions.

Study area

The study will be conducted in the same diverse urban and peri-urban areas as the overall AIRCARE cohort study. The study area will be chosen to ensure the representation of various vulnerable populations, including children and adolescents, elderly individuals, individuals with pre-existing respiratory conditions (e.g., asthma, COPD), and individuals with low socioeconomic status.

Sample size estimation and sampling strategy

Sample size will be taken based on feasibility using the above-mentioned cohorts. The existing longitudinal cohort will be used, ensuring representation across different exposure and risk factor strata. Incident lung cancer cases within the cohort will be identified, and controls will be matched based on age, sex, residential area, and where possible, smoking history. A subset

of the cohort will be selected for genotyping, focusing on individuals with extreme exposure levels and/or lung cancer cases and controls for genetic interaction studies.

Project Implementation Plan

Primary Outcome will be measured with differences in lung cancer incidence rates across vulnerable subgroups, and hazard ratios for lung cancer associated with air pollution exposure in each vulnerable subgroup. Secondary Outcomes will be measured with differences in lung cancer mortality rates across vulnerable subgroups, levels of biomarkers in vulnerable subgroups, and the impact of socioeconomic factors on the increased risk.

Design of statistical analysis

Cox proportional hazard models will be used to estimate hazard ratios for lung cancer in each vulnerable subgroup, with adjustment for potential confounders. Interaction terms will be included in regression models to assess the modifying effect of vulnerable population status on the association between air pollution and lung cancer. The stratified analysis will be used to assess the effect of air pollution within each vulnerable population.

Chi-square tests or t-tests will be used to compare lung cancer incidence rates and other outcome measures across vulnerable subgroups. Analysis of variance (ANOVA) will be used to compare continuous outcome measures across multiple vulnerable subgroups. Logistic regression will be used to assess the association between vulnerable population status and specific health outcomes. Multiple linear regression will be used to analyze the effect of air pollution on lung function and biomarker levels in vulnerable subgroups. Statistical software packages such as R, SAS, and Python will be used for data analysis.

Cost-effectiveness analysis will be used to assess the economic impact of the interventions. Statistical software packages such as SPSS, R, and NVivo will be used for data analysis. Campaign materials in terms of readability, cultural competence, and messaging will be evaluated.

Key Project Activities and Timeline (Please describe the key activities and proposed project timeline) (32500 character):

Timeline of the project	**Year 1**				**Year 2**				**Year 3**			
Quarters	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
IRB approval, Hiring, and training of staff	X	X	X	X								
Air monitoring setup, Pilot data testing, preliminary analysis			X	X	X	X						
Subjects' enrolment and data collection			X	X	X	X	X	X				
Exposure data collection					X	X	X	X	X	X		
Model validation and Interaction analysis									X	X		
Data analysis and audit				X				X				X
Final data analysis and report										X	X	X

The project will commence with Institutional Review Board (IRB) approval, hiring and training of staff in the first year. The second half of the first year up to the first two quarters of the second year will involve setting up the air monitoring system which will be accompanied by testing of pilot data and preliminary analysis of the same. The subject enrolment and data collection will span the last two quarters of the first year till the end of the second year with exposure-related data collection being conducted from the beginning of the second year till the first half of the third year. The project will be subject to scheduled data analysis and audits which will take place at the end of the last quarter of each year. The final report and data analysis will be done from the second to last quarters of the third year.

Innovation (Explain the key innovative elements that differentiate this project's approach from how healthcare is currently delivered. How will this project drive innovative solutions to address unmet needs?) (32500 character):

AIRCARE will be a groundbreaking initiative designed to address critical gaps in understanding the link between air pollution and lung cancer. Unlike traditional frameworks that examine air pollutants in isolation, AIRCARE will adopt an integrated approach, evaluating the combined and individual impacts of air pollution with other lung cancer risk factors. This comprehensive methodology will aim to uncover the unknown multiplicative interactions between air pollutants and other risk factors.

With high-resolution air quality monitoring and innovative biomarker analyses, AIRCARE will assess exposure levels and lung cancer risks more precisely. Given the rising incidence of lung cancer in non-smokers in India and the growing recognition of air pollution as a significant risk factor, AIRCARE will develop risk stratification models tailored to PM2.5 exposure for effective lung cancer screening.

A multidisciplinary team of experts in oncology, environmental sciences, public health, and epidemiology will guide this innovative research. By focusing on risk calculation, stratification, and screening strategies, AIRCARE will aim to transform research into actionable solutions, influencing public health policies and reducing lung cancer morbidity and mortality through evidence-based interventions.

Model of Care (Describe the model of care in detail. How will the proposed model of care be integrated into the overall healthcare system? How will you ensure that program participants are linked to care and receive appropriate follow-up?) (10,000 character):

AIRCARE will aim to achieve its objectives through a comprehensive, phased research approach that will integrate expertise from oncology, epidemiology, exposure science, and data modelling. The research will employ longitudinal cohort and case-control studies conducted in Delhi and NCR region with diverse pollution levels to capture variability in exposure and associated lung cancer risks. Air pollution exposure will be quantified using a combination of satellite-derived data, air quality monitoring stations, and individual exposure monitors, ensuring high-resolution and accurate measurement. Demographic, lifestyle, and clinical data including smoking history, genetic predisposition, and occupational exposures, will be collected from study participants to provide a holistic view of risk factors.

Advanced regression models and machine learning techniques will be employed to analyse the individual and cumulative effects of pollutants like PM2.5, and other risk factors on lung cancer incidence. These tools will enable the identification of patterns and correlations that traditional methods might overlook, offering deeper insights into the intricate relationships between PM 2.5 and lung cancer risk. A predictive stratification model will be developed to assess the risk of lung cancer using PM2.5 exposure data integrated with demographic, genetic, and behavioural factors. This model will be built using a training dataset derived from historical data, including population-based cancer registries and air pollution records. It will be validated to ensure the reliability of this model. This step will involve comparing the model's predictions with actual lung cancer incidence data. Sensitivity, specificity, and predictive accuracy will be evaluated using statistical tools like receiver operating characteristic (ROC) curves and calibration plots, which will help refine the model and confirm its applicability across diverse populations.

The interaction between air pollution and other established lung cancer risk factors, such as smoking, genetic susceptibility, and occupational hazards, is also an objective. Statistical models will be employed to quantify these multiplicative effects, providing insights into how different risk factors exacerbate one another. The study will assess the differential impact of air pollution on populations stratified by age, sex, socioeconomic status, and pre-existing health conditions. Geospatial analysis tools will be utilized to create heatmaps that identify high-risk areas, aiding in the design of targeted interventions for vulnerable groups.

Advanced methodologies will play a pivotal role in enhancing the precision of exposure assessments. These will include the use of personal exposure sensors, high-resolution satellite imaging, and land-use regression models. There will be identification and validation of biomarkers which can be indicators of air pollution exposure and early predictors of lung cancer development. This approach will help to identify biomarkers expressed in the Indian population and serve as a benchmark for the development of point-of-care devices for lung cancer screening using liquid biopsy.

Will your project seek to? (Select all that apply.)

1. **Facilitate patient, family and community education and empowerment**
2. **Strengthen health systems and capacity**

3. **Improve patient outcomes**
4. **Integrate and sustain progress**
5. None

Please describe how your project/intervention plans to improve patient outcomes (32500 character)

The AIRCARE (Air Pollution and Cancer Research Ecosystem), as a Center for Advanced Research on Environmental Health and Lung Cancer Risk at AIIMS Delhi, will be an innovative and multidimensional program that will aim to transform the landscape of lung cancer prevention, early detection, and risk communication in India. AIRCARE will generate robust scientific evidence, enable precise risk stratification, enhance clinical decision-making, and empower communities through a carefully designed set of interconnected objectives, ultimately resulting in improved patient outcomes across the lung cancer care continuum.

The cornerstone of AIRCARE's strategy will be to improve patient outcomes with a commitment to bridge critical gaps in the understanding of environmental determinants of lung cancer, particularly PM2.5 exposure, and translating this knowledge into actionable public health tools. AIRCARE will assess the link between PM2.5 exposure and lung cancer risk, including the evaluation of multiplicative interactions with other risk factors such as tobacco use, occupational exposures, genetic susceptibility, and comorbidities. By leveraging high-resolution exposure modeling, geospatial analytics, and patient-level clinical data, AIRCARE will generate India-specific evidence that contextualizes ambient air pollution as a carcinogen in both smoking and non-smoking populations. This effort will improve diagnostic accuracy by helping clinicians recognize air pollution as an independent and synergistic risk factor, particularly in regions with high particulate matter levels but low smoking prevalence.

AIRCARE will also translate this environmental exposure data into clinically meaningful tools by developing and validating a risk-based stratification model for lung cancer screening. The current global lung cancer screening protocols are predominantly designed for high-income countries and rely heavily on smoking history, which does not capture the unique risk landscape in India and other low- and middle-income countries where a significant proportion of lung cancer occurs in never-smokers. AIRCARE will address this mismatch by

creating stratification algorithms that integrate PM2.5 exposure metrics, demographic variables, behavioral factors, and clinical parameters to identify individuals at high risk. This model will allow clinicians and policymakers to prioritize screening resources for those most likely to benefit, thus reducing the burden of late-stage lung cancer diagnoses and enabling timely interventions. The result will be an increase in the proportion of lung cancers detected at early stages when treatment is more effective, leading to improved survival outcomes.

AIRCARE will also focus on identifying biomarkers that are specific to PM2.5-associated lung cancer. This component of the project will involve high-throughput molecular profiling of biospecimens from patients with documented high PM2.5 exposure histories. These efforts will help uncover biological pathways activated by chronic air pollution exposure and enable the development of biomarker panels that can facilitate early detection, risk monitoring, and therapeutic targeting. Biomarkers will also help differentiate lung cancer cases arising from environmental exposure from those driven by tobacco, thus enhancing diagnostic precision and guiding individualized treatment plans. In the long run, this molecular insight will lay the foundation for integrating environmental carcinogenesis into precision oncology frameworks in India.

AIRCARE will also have an important emphasis on identifying and supporting vulnerable populations disproportionately affected by air pollution-related lung cancer. These include urban poor communities, populations residing near industrial zones, women exposed to both ambient and household air pollution, and outdoor workers. The project will assess these groups' susceptibility through epidemiological profiling, community surveys, and participatory research methods, ensuring that data-driven interventions are grounded in local realities.

Please describe how your project/intervention plans to strengthen health systems and build capacity to better diagnose and treat your target therapeutic area (32500 character)

The AIRCARE will serve as a catalytic force in transforming India's ability to recognize, diagnose, and treat lung cancer arising from environmental exposures, particularly fine particulate matter (PM2.5). AIRCARE will adopt a systems-based approach that not only generates critical scientific evidence but also strengthens institutional capacity, builds

workforce competencies, and enhances data and service delivery infrastructure, ensuring long-term resilience and responsiveness of the health system to environmental carcinogenesis by targeting the intersection of environmental health and oncology.

The project will generate the first population-level evidence on the relationship between PM2.5 exposure and lung cancer in India. AIRCARE will clarify the direct and multiplicative effects of air pollution in both smokers and never-smokers. Lung cancer screening protocols in India are underdeveloped and rely heavily on symptom-based detection, which leads to late-stage diagnoses and poor outcomes. By incorporating PM2.5 exposure levels, age, gender, family history, smoking status, and comorbidities, AIRCARE will create predictive algorithms that can be used by clinicians to identify high-risk individuals, including never-smokers. The project will identify and validate biomarker signatures associated with PM2.5-related lung carcinogenesis through state-of-the-art molecular pathology, and genomics at AIIMS Delhi. These biomarkers will improve diagnostic specificity, aid in the subtyping of lung cancer in never-smokers, and contribute to the growing field of environmental precision oncology.

As a center of excellence, AIIMS Delhi will play a leadership role in mentoring other regional cancer centers to replicate the AIRCARE model, thus creating a nationwide network equipped to address lung cancer from an environmental health perspective. AIRCARE will be represented as a comprehensive and scalable model for health system strengthening in response to the emerging challenge of air pollution-induced lung cancer.

Please describe how your project/intervention plans to facilitate patient, family and community education and empowerment (32500 character)

AIRCARE at AIIMS Delhi will be a project designed not only to advance scientific understanding of the link between PM2.5 exposure and lung cancer, but also to foster deep-rooted education, empowerment, and engagement of patients, families, and communities.

Patient and family education will be an important component of AIRCARE's strategy to translate complex scientific findings into actionable health information. For individuals diagnosed with lung cancer, especially those with no traditional risk factors such as smoking, AIRCARE will develop personalized educational materials that explain the role of air pollution in cancer causation. These materials will include printed leaflets, infographics, videos, and

mobile-based content tailored to literacy levels and linguistic preferences. Information will cover the nature of PM2.5 and its sources, mechanisms of lung injury and carcinogenesis, symptoms to watch for, available diagnostic services, and preventive steps such as reducing outdoor exposure during high pollution periods and improving indoor air quality through ventilation and filtration.

Families, often the primary caregivers and decision-makers in Indian households, will also be educated on the importance of follow-up care, adherence to treatment, participation in survivorship planning, and advocating for healthier living environments. Special focus will be placed on caregivers of never-smoker lung cancer patients, who often experience greater emotional and informational gaps due to the unexpected nature of the diagnosis.

Sustainability (How is your project positioned to maintain progress upon grant conclusion? Does this have the potential to be replicated and/or scaled if successful? Describe your project's ambition to affect health policy, if applicable.) (32500 character):

The project will continue to monitor the progress and outcomes of the enrolled patients upon its conclusion for a reasonable period of time. This will include gathering data and providing care as well as referrals where necessitated. The project will be envisioned to be a scalable model wherein data from other centres across the geography of India can be obtained with new cohorts being enrolled in these locations in order to scale the project at a multi-centric level. The project will employ methodologies which are replicable in different Indian contexts and are amenable to inter-se comparison between the datasets so obtained.

The project will provide crucial data on the effects of air pollution exposure and its relation to the causation of lung cancer. Seeing as India is home to some of the most polluted cities in the world, this information will be indispensable in policy matters. The data will be able to inform health policy across the board by advising on matters such as air quality management, and lung cancer screening pathways. Policy-related engagement with stakeholders will entail collaboration on producing relevant white papers during the course of as well as at the conclusion of the project.

Monitoring and Evaluation Plan (What key indicators will be used to measure program success? How do you plan to track the progress of your program?) (32500 character)

Causal association of PM 2.5 exposure and Lung cancer will be measured in terms of histologically confirmed incidence of lung cancer. The interaction effects between air pollution (PM2.5) and other risk factors (smoking, Alcohol consumption, occupational exposures, genetic susceptibility) on lung cancer incidence and cumulative risk of lung cancer associated with combined exposure to air pollution and other risk factors will be evaluated.

Outcomes pertaining to cumulative and multiplicative interactions will be measured with the impact of interaction effects on lung cancer histological subtypes, modification of lung cancer risk by genetic variants in the presence of air pollution exposure, changes in biomarker profiles associated with combined exposures, and synergistic effects of PM 2.5 and other risk factors.

Screening-based risk prediction will be measured based on the performance of the risk stratification model in predicting lung cancer risk, assessed by area under the receiver operating characteristic (AUROC) curve, sensitivity and specificity at predefined risk thresholds, and using calibration plots, to assess the agreement between predicted and observed risks.

The external validity of this dataset will be measured in terms of the positive predictive value (PPV) and negative predictive value (NPV) of the model, the impact of the model on lung cancer detection rates and stage distribution, and the model's ability to correctly categorize risk in prespecified subgroups.

Lung cancer specific biomarker identification will be done by means of identification of biomarkers that are significantly associated with air pollution-related lung cancer and the predictive ability of the biomarkers to discern between cases and controls. Further, the association between biomarker levels and air pollution exposure levels, temporal changes in biomarker levels associated with lung cancer development, association between biomarker levels and lung cancer histological subtypes, usefulness of biomarker panels for early lung cancer detection and ability of the biomarkers to predict treatment response will be evaluated.

The identification of vulnerable groups or populations will be tracked by measuring the differences in lung cancer incidence rates across vulnerable subgroups and hazard ratios for lung cancer associated with air pollution exposure in each vulnerable subgroup.

The susceptibility of certain groups to lung cancer as result of exposure to air pollution will be measured with differences in lung cancer mortality rates across vulnerable subgroups, levels

of biomarkers in vulnerable subgroups, and the impact of socioeconomic factors on the increased risk.

Monitoring and Evaluation Plan Files (Please attach supplemental materials related to the project's monitoring and evaluation activities here. Examples include a logic model Click here for Example, key indicators, and data collection and monitoring plan Click here for Template):

Dissemination Plan (Provide a detailed description of the dissemination plan for effective uptake and sharing of lessons learnt from this project. Include any of the following: peer-reviewed publication plan, conference presentation or participation, dissemination of lessons learned on relevant national and international platforms, and media outreach plan) (32500 plan):

Following project completion, the immediate next steps will be dissemination of findings through peer-reviewed publications and policy white papers and implementing validated risk stratification models into clinical practice for lung cancer screening after exposure to PM 2.5, development of biomarker assays, advocacy at the national level to ensure policy changes based on research findings, establishing a long-term cohort for continuous monitoring.

The peer-reviewed publication plan will involve identifying the different domains of data gathered in the course of the project. Depending on the data gathered and the domain explored, multiple manuscript submissions may be necessitated in order to report the complete spectrum of findings gathered from the project.

During the course of the project and afterwards, the project staff will be involved in making presentations at relevant national and international conferences in order to disseminate the findings of the project pertaining to whichever stage it might be at. These presentations will encompass posters, papers and any other relevant presentation formats either in-person or virtual.

The media outreach plan will involve engaging stakeholders and disseminate the findings as well as the progress of the project in a timely manner. The media outreach will potentially be all-encompassing in terms of platforms and popular personalities which best suit the message being sought to be delivered to the general public.

Budget:

Institute	Budget Year	Manpower Budget (Rs.)	Consumables	Equipment	Travel	Total	Overhead (10%)	Total after Overhead
All India Institute of Medical Sciences, Delhi	1	1,29,94,800.00	33,00,000.00	2,43,61,440.00	20,00,000.00	4,26,56,240.00	42,65,624.00	4,69,21,864.00
All India Institute of Medical Sciences, Delhi	2	1,29,94,800.00	32,00,000.00	0	15,00,000.00	1,76,94,800.00	17,69,480.00	1,94,64,280.00
All India Institute of Medical Sciences, Delhi	3	1,29,94,800.00	32,00,000.00	0	17,00,000.00	1,78,94,800.00	17,89,480.00	1,96,84,280.00
Total (in Rs.):		**3,89,84,400.00**	**97,00,000.00**	**2,43,61,440.00**	**52,00,000.00**	**7,82,45,840.00**	**78,24,584.00**	**8,60,70,424.00**
						In USD (1 USD= 86 INR)		**$ 1000818.89**

***Currency type for funds being requested: (Select the currency requested for this grant. All grants should be made in local currency – please have a foreign exchange rate conversion to USD listed in the final budget.):** INR – Indian Rupee

Request Amount (What is the amount of money being requested for this project?): **Rs. 8,60,70,424.00**

Support from other Funders (List all other potential funders, and amounts committed or pending) (2000 character):

BMSF Total Budget Instructions (Please provide your project's total detailed budget itemized by line items and by year, in excel. including funds requested from BMS Foundation and any additional co-founders. Please email the excel budget directly to the appropriate BMS program officer.)

Budget Justification (Provide budget justification for each line item of the project.) (32500 character maximum)

Budget 1st year:

Project staff salary: 1,29,94,800.00

Consumables: 33,00,000.00

Equipment: 2,43,61,440.00

Travel: 20,00,000.00

Overhead (10%): 42,65,624.00

Total budget 1st year: 4,69,21,864.00 INR

In USD: $ 545,603.07

Budget 2nd year:

Project staff salary: 1,29,94,800.00

Consumables: 32,00,000.00

Travel: 15,00,000.00

Overhead (10%): 17,69,480.00

Total budget 2nd year: 1,94,64,280.00

In USD: $ 226,328.84

Budget 3rd year:

Project staff salary: 1,29,94,800.00

Consumables: 32,00,000.00

Travel: 17,00,000.00

Overhead (10%): 17,89,480.00

Total budget 3rd year: 1,96,84,280.00 INR

In USD: $ 228,886.98

Total Budget for 3 years: 8,60,70,424.00 INR

In USD: $ 1,000,818.89

Project Research Scientist-III (Medical) is crucial for providing clinical expertise, overseeing medical aspects of the studies, and ensuring accurate clinical data interpretation. Scientist will oversee the medical aspects of the cohort and case-control studies, ensuring the accurate collection and analysis of clinical data. They will contribute to the development of risk stratification models and the interpretation of clinical outcomes. This individual will manage the medical oversight of the project, including the coordination with hospital partners and the supervision of the project, and will be instrumental in biomarker identification and policy recommendations. They will be essential for the generation of policy briefs, and stakeholder meetings

Project Research Scientists-II (Non-Medical) are essential for specialized tasks: one biostatistician to design and execute statistical analyses, one bioinformatician for genomic and biomarker data analysis, and one laboratory scientist to manage sample processing and associated laboratory work. These scientists will be responsible for the design and implementation of statistical analyses, managing large datasets, performing sample size calculations, ensuring the validity of statistical findings, designing and implementing ecological studies, analysis of genomic and biomarker data, including the identification of genetic susceptibility factors and the interpretation of biomarker results, oversee laboratory operations, including the processing and analysis of biological samples for biomarker assessment, quality control of laboratory data and develop standardized protocols for sample handling. These scientists will be essential for the analysis of the data collected from the personal exposure sensors, high-resolution satellite imaging, and land-use regression models.

Project Research Scientists-I (Non-Medical) will be required for laboratory work and will be engaged in biomarkers-related work after exposure to PM 2.5. Scientists will be responsible for the analysis of genomic and biomarker data, including the identification of genetic susceptibility factors and the interpretation of biomarker results, oversee laboratory operations, including the processing and analysis of biological samples for biomarker assessment, quality control of laboratory data and develop standardized

protocols for sample handling.

Project Technical Support-III personnel will play a large role in supporting in data collection from the monitoring devices along with maintenance of air quality monitoring equipments. As this project will have data collection from the Delhi and NCR, 8 people will be required for better coverage and accuracy of data.

Project Technical Support-II staff will assist with laboratory procedures, including sample processing, data entry, and equipment maintenance. They will aid in the organization and maintenance of the laboratory. They will aid in the data entry of the information collected from the study.

Project Nurse-IV will provide clinical support for the cohort and case-control studies, collecting medical histories, administering assessments, and coordinating patient care, reporting directly to the medical research scientist.

Equipment

Sl. No.	Equipment Name	Justification
1.	Portable Air Quality Sensors – 8 units	To measure the pollution level of air pollution component at different location
3.	Indoor Air Quality Measurement Kits – 8 units	To measure the pollution level of air pollution component indoor
4.	Wearable air quality monitor – 20	To measure personalized exposure to pollution
5.	Genetic Sequencer DNBseq-G99 with Megabolt server	The DNBseq-G99 genetic sequencer is crucial for high-throughput, high-precision sequencing, enabling accurate and efficient DNA sequencing for a wide range of genomic applications, including whole-genome analysis, transcriptomics, and variant detection.
6.	-20 Deg C Refrigerator	-20C refrigerator is required for the long-term storage of samples and reagents, ensuring their stability and preserving their integrity until they are needed for further use in experiments.

7.	4 Deg C Refrigerator	A 4°C refrigerator is required for the short-term storage of samples and reagents, ensuring their stability and preserving their integrity until they are needed for further use in experiments.
8.	Thermal Cycler (PCR)	Thermal cycler is essential for precise temperature control during library preparation for next-generation sequencing (NGS), ensuring accurate amplification and efficient enzymatic reactions necessary for high-quality sequencing results.
9.	Magnetic Stand 16 wells (DynaMag 2)	16-well magnetic stand is vital for efficiently separating magnetic beads from samples in high-throughput applications, providing quick and reliable separation in a 96-well format for streamlined processing of multiple samples simultaneously.
10..	Magnetic Stand 96 wells (Ambion)	96-well magnetic stand is vital for efficiently separating magnetic beads from samples in high-throughput applications, providing quick and reliable separation in a 96-well format for streamlined processing of multiple samples simultaneously.
11.	4150 Tapestation Desktop System (Size determination of DNA library & RNA QC) OR Qsep System	Tapestation is essential for high-throughput analysis and quality assessment of nucleic acids, enabling fast and accurate sizing, quantification, and integrity evaluation of DNA and RNA samples for various molecular biology applications.
12.	Qubit Fluorometer	Qubit fluorometer is necessary for accurately measuring the concentration of nucleic acids and proteins using fluorescence, providing precise and reliable quantification with minimal sample volume for various molecular biology applications.
13.	Minispin centrifuge	Minispin centrifuge is essential for quickly and efficiently spinning small sample volumes, allowing for rapid separation and concentration of components in microtubes, while maintaining convenience and space efficiency in the lab.
14.	Vortexer	Vortexer is crucial for rapidly and uniformly mixing small sample volumes, ensuring thorough and consistent agitation to achieve accurate and reliable results in various laboratory applications.

15.	Thermomixer	Thermomixer is essential for precise temperature control and efficient mixing of samples, ensuring consistent and reliable results in experiments that require both heating and agitation.
16.	Refrigerated Centrifuge for 1.5/2ml ml tubes upto 10,000g or higher - Eppendorf 5180R	A refrigerated centrifuge for 1.5/2 ml tubes is required to efficiently separate samples at low temperatures, preventing sample degradation and ensuring optimal results during centrifugation.
17.	Pipets set Manual single channel (0.1-2.5ul, 0.5-10ul, 2-20ul, 10-100ul, 20-200ul, 100 to 1000 ul)	Pipettes are essential for accurate and precise liquid measurement and transfer, ensuring consistency and reliability in experimental procedures.
18.	Multichannel pipette - With suitable stand.	Pipettes are essential for accurate and precise liquid measurement and transfer, ensuring consistency and reliability in experimental procedures.
19.	Dry Bath	A dry bath is needed for precise temperature control during sample incubation, ensuring consistent heating without the risk of water contamination or cross-sample interference.
20.	Refrigerated Centrifuge with Swing out plate rotor Thermo / Eppendorf	A refrigerated centrifuge with a swing-out plate rotor (Thermo/Eppendorf) is essential for efficiently separating samples at low temperatures, ensuring sample stability and preventing degradation during centrifugation.
21.	Vaccum Concentrator	A vacuum concentrator is necessary for efficiently concentrating samples by removing solvents under controlled conditions, preserving sample integrity, and reducing the risk of contamination.
22.	Water Purification system	A water purification system is essential for producing molecular-grade reagents while ensuring they remain free of DNase and RNase contamination.

Consumables (Details; Justification)	
Detail	Breakup with Justification
Year 1: High throughput SM G99 Sequencing kit PE 150, MGIEasy Circulating DNA Isolation Kit, Circulating Tumour gene- 188 Gene Variant Assay	Consumable includes ctDNA storage sample vials, ctDNA isolation kits, ct-DNA 188 Gener variant assay chip, High throughput SM G99 Sequencing kit PE 150, MGIEasy Circulating DNA Isolation Kit, Circulating Tumour gene- 188

	Gene Variant Assay, Cell culture reagents including RPMI media, FBS, Pen/step, t25 flask, t75 flask, 6 well plates, collection tubes for supernatant, library preparation kits, cover various ancillary expenses associated with the project. These include the procurement of stationery and other office supplies necessary for routine documentation and research activities, Statistical analysis software, and data visualization tools.
Year 2:	It will be used to purchase reagents for biomarker testing and method optimization, collection kits, including tubes, swabs, preservatives, and maintenance kits for monitoring devices. cover various ancillary expenses associated with the project. These include the procurement of stationery and other office supplies necessary for routine documentation and research activities, Statistical analysis software, and data visualization tools.
Year 3:	It will be used to purchase reagents for initial biomarker testing and method optimization, collection kits, including tubes, swabs, and preservatives basic maintenance kits for monitoring devices. cover various ancillary expenses associated with the project. These include the procurement of stationery and other office supplies necessary for routine documentation and research activities, Statistical analysis software, and data visualization tools.

Equipment	
Detail	Breakup with Justification
Year 1:	Portable Air Quality Sensors – 4; Indoor Air Quality Measurement Kits – 4: Wearable air quality monitor – 20; Genetic Sequencer DNBseq-G99 with Megabolt server; -20 Deg C Refrigerator; -4 Deg C Refrigerator: Thermal Cycler (PCR); Magnetic Stand 16 wells (DynaMag 2); Magnetic Stand 96 wells (Ambion): 4150 Tapestation Desktop System (Size determination

	of DNA library & RNA QC) OR Qsep System: Qubit Fluorometer; Minispin centrifuge; Vortexer; Thermomixer; Refrigerated Centrifuge for 1.5/2ml ml tubes upto 10,000g or higher - Eppendorf 5180R; Pipets set Manual single channel (0.1-2.5ul, 0.5-10ul, 2-20ul, 10-100ul, 20-200ul, 100 to 1000 ul); Multichannel pipette - With suitable stand; Dry Bath; Refrigerated Centrifuge with Swing out plate rotor Thermo / Eppendorf; Vaccum Concentrator; Water Purification system

Travel and Events	
Detail	Justification
Year 1:	This will be required to support the travel to for the training of the team and to conduct outreach activities, conduct workshops and training workshops, seminars and conferences on air pollution and lung cancer. Travel for key personnel to attend training sessions on specialized techniques (e.g., air quality monitoring, biomarker assays, data management) and project management workshops, visit study sites for initial feasibility assessments.
Year 2:	This will be required to support the travel to for the training of the team and to conduct outreach activities, conduct workshops and training workshops, seminars and conferences on air pollution and lung cancer. This study will target the most vulnerable populations, such as children, the elderly, and those with pre-existing conditions. Continued travel for field teams to collect longitudinal data and monitor air quality across study sites, stakeholders meeting and present the initial findings at national and international conferences.
Year 3:	This will be required to support the travel to for the training of the team and to conduct outreach activities, conduct workshops and training workshops, seminars and conferences on air pollution and lung cancer. Continued travel for field teams to collect longitudinal data and monitor air quality across study sites, Travel for project team members to present initial research findings at national and international

	conferences.

Attachments (Please attach any supporting documents or supplemental materials (may include: work plans, letters of support, or memorandums of understanding) needed to properly evaluate your proposed project. This is optional.)