



Occupational exposures among women beedi workers in Mysore District, India: A mixed-methods study

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Conflict of Interest

All the investigators have declared no conflict of interest.



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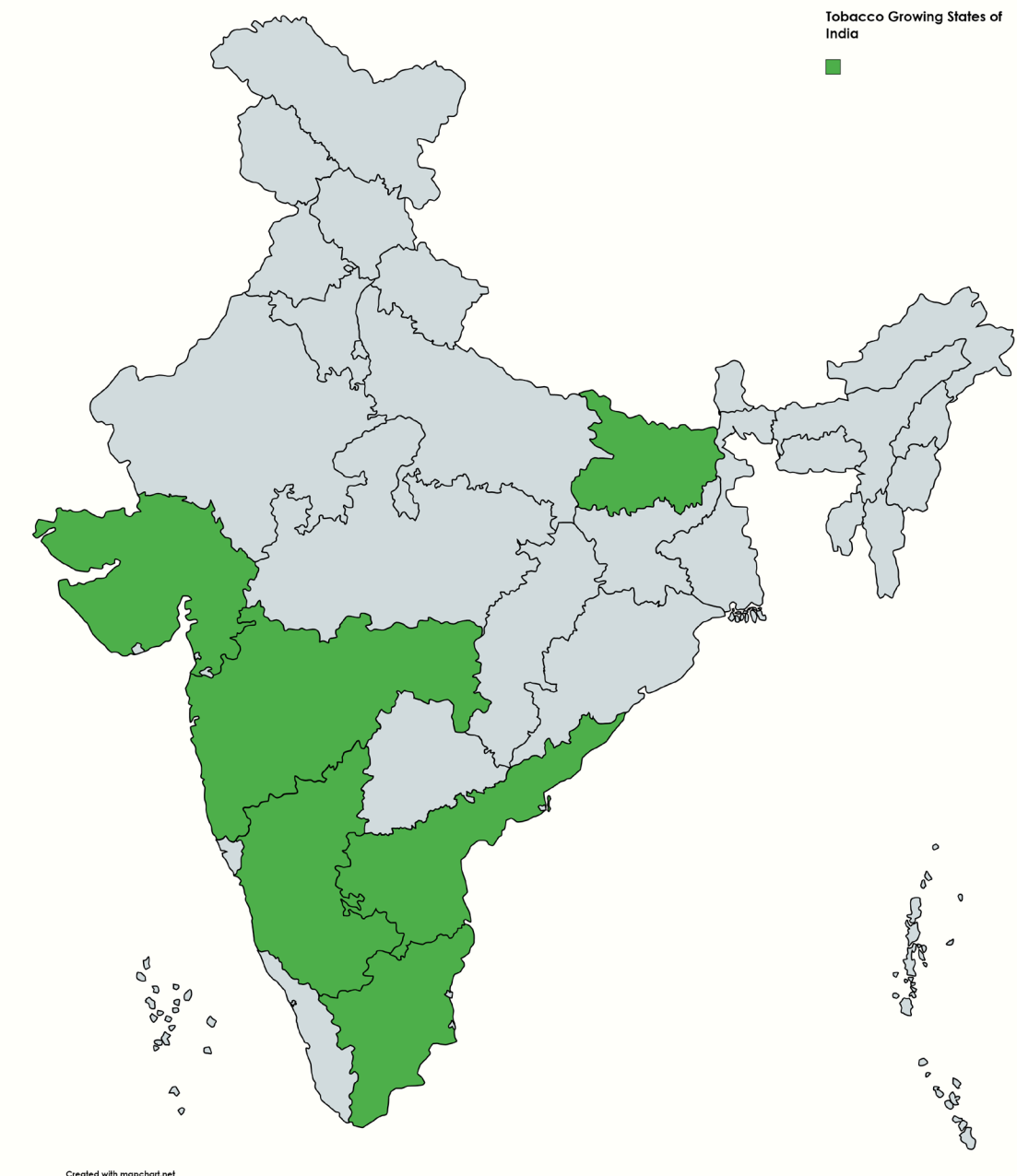


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Tobacco in India

- India is the 3rd largest tobacco growing nation and 2nd largest tobacco consumer
- Karnataka, Andhra Pradesh, Gujarat, Maharashtra, Bihar and Tamil Nadu are the major tobacco-producing states
- Important cash crop grown on 0.4 million hectares, 0.27% of the net cultivated area



Source: <https://www.mapchart.net/india.html>

Tobacco in India

- Traded domestically and internationally
- Contributes about 298 million USD per year towards foreign exchange, approximately 4% of the total agricultural exports of India
- It costs billions of dollars for the Indian government to deal with occupational illnesses, disabilities, and deaths among the farmers and workers



Source: Self photo

Beedi

- *Beedi*, known as the poor man's cigarette, is manufactured in many states of India and Bangladesh, and are associated with various health risks
- Hand-rolled smoking form of tobacco
- *Beedi* exported, available in different flavors
- Now available in different parts of the world



Source: <https://www.medindia.net/news/bidi-smoking-pushes-more-households-to-poverty-in-india-184656-1.htm>

Beedi in India

- The process of making *beedi* includes collecting tendu leaves and tobacco, rolling them into *beedis*, then sorting, labeling, wrapping, and packing
- Formal and informal industry
- Majority of the employees are women from home
- Earn Rs. 200 (\$2.5)/day for 1000 *beedi*
- Workplaces have working conditions with poor lighting and ventilation, overcrowding, and tobacco dust exposure.



Source: <https://www.wbur.org/npr/768397209/india-banned-e-cigarettes-but-beedis-and-chewing-tobacco-remain-widespread>

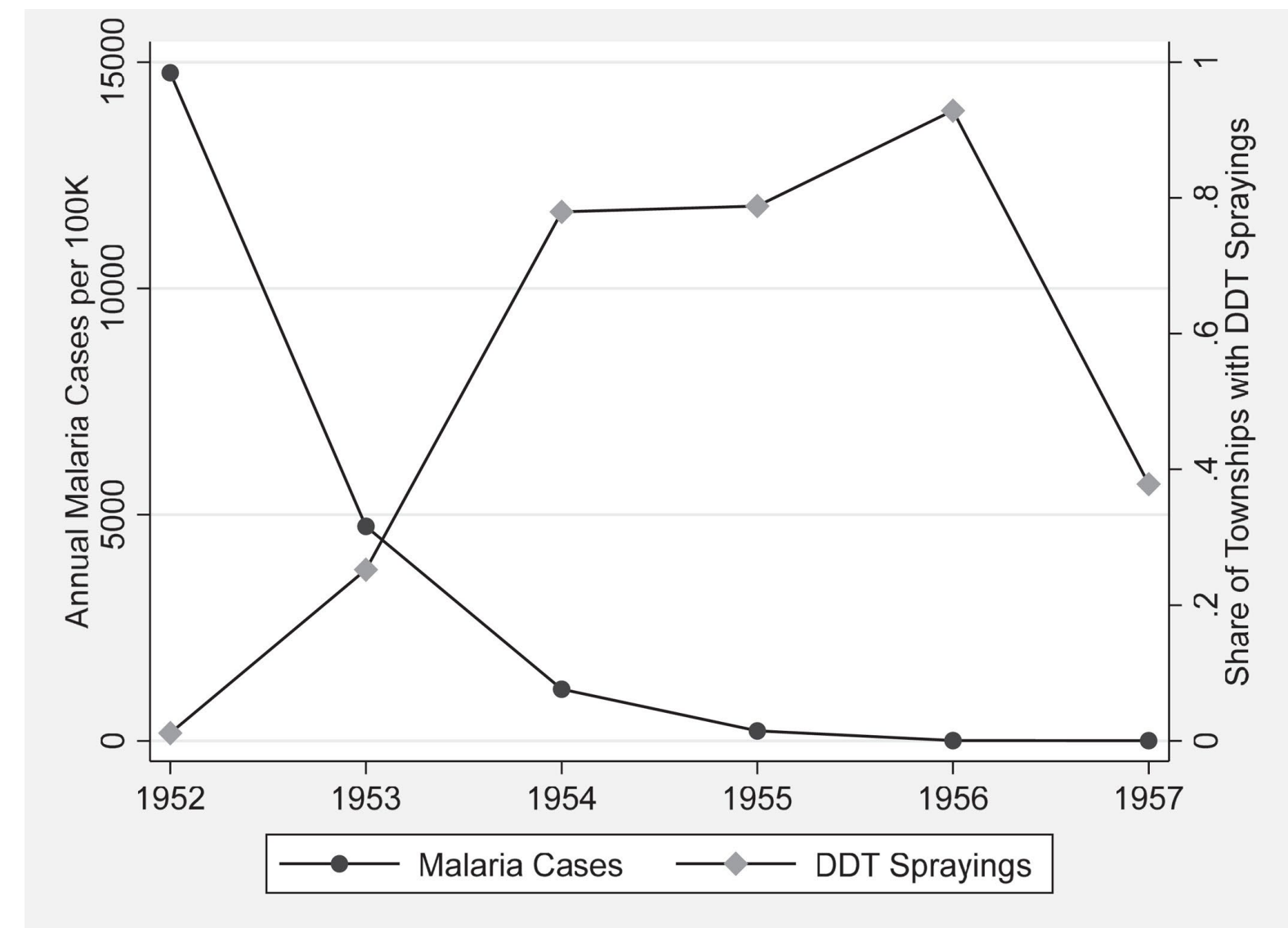


Occupational Diseases

- Green tobacco sickness
- Tobacco dust exposure related to the risk of cervical cancer
- One out of six show signs of toxic optical neuropathy
- Gynecological problems, respiratory problems, malnutrition, and musculoskeletal problems
- Gap – no qualitative study to understand the occupational health concerns and no study on the occupational environmental measures

Pesticides

- Organochlorine pesticides (OCP)
- DDT (dichloro-diphenyl-trichloroethane) - insecticides in the 1940s.
- Synthetic and lipophilic compound
- The US banned DDT use in 1972
- Used as a pesticide for malaria, typhus, and other insect-borne human diseases

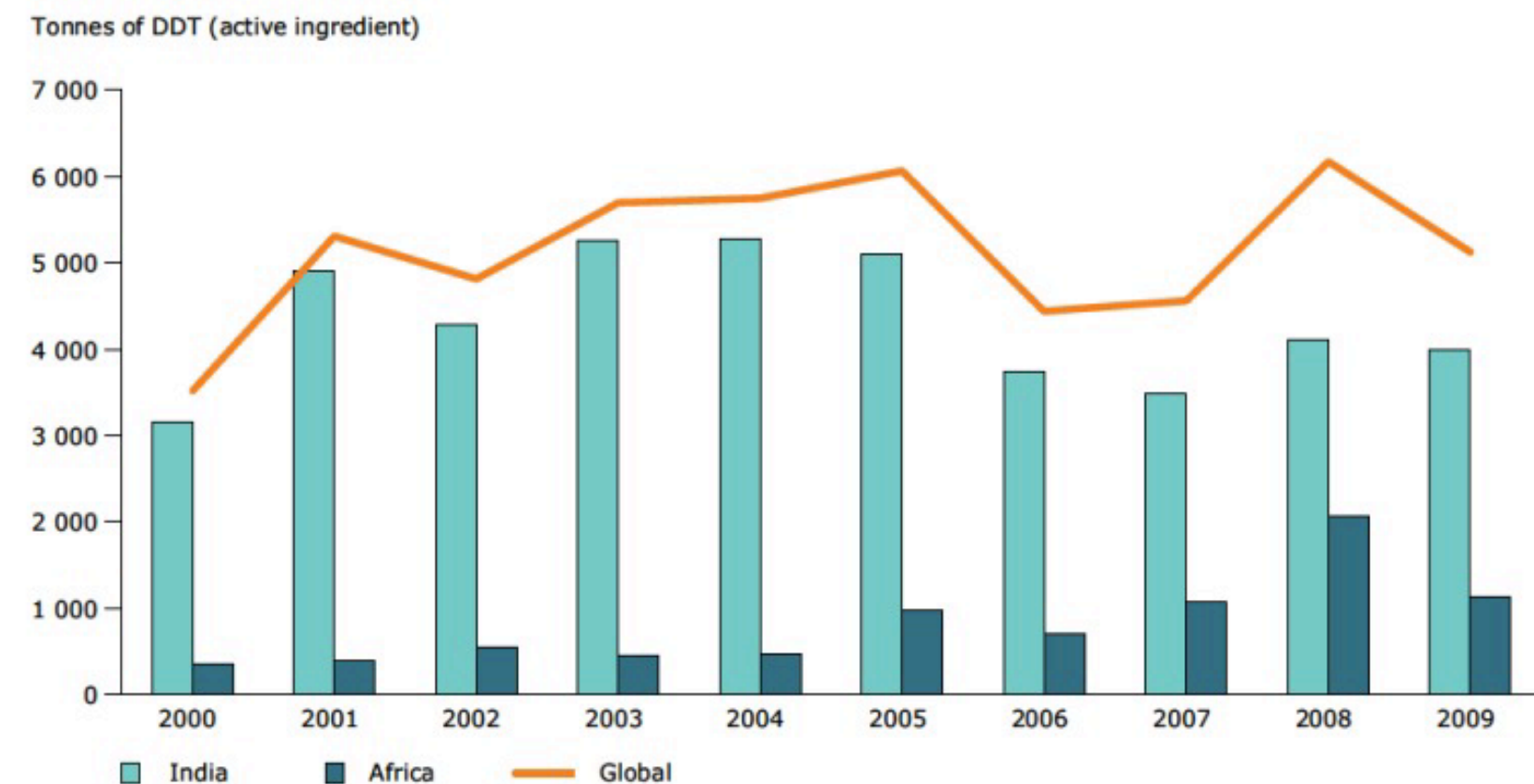


Source: Chang (2022)

Pesticides

Health effects

- Endocrine-disrupting chemicals – interfere with hormones
- Reproductive health – spontaneous abortion, preterm birth
- Group 2A (IARC) – non-Hodgkin lymphoma, testicular cancer, and liver cancer



Source: WHO (2010)



Heavy Metals

- Lead, cadmium, chromium, nickel, and arsenic were found in the commercial cigarettes.
- During work, tobacco workers are exposed to lead through the skin, ingestion, and inhalation.
- Lead, cadmium and Chromium were detected in the fingernails and palms of beedi workers.
- Heavy metals like lead does not have any physiological significance in the human body; therefore, any amount of lead in human body is a contaminant.



Mixed methods study

- We conducted a mixed methods study with convergent parallel core design in which qualitative and quantitative data were collected in parallel, analyzed separately, and then findings were merged to provide policy recommendations

Aim

- Aim 1: Explore the experiences and challenges faced by the women *beedi* workers handling unburnt tobacco in a workplace setting using Photovoice, a community-based participatory method.
- Aim 2: Determine the occupational exposures among women *beedi* workers in Mysore, India. Participants include 30 women beedi workers and 30 age- and socioeconomic status-matched non-beedi workers. Occupational exposures were estimated via analysis of a silicone wristband worn for seven days during working hours. In addition, dust samples will be collected at the study participants' homes to estimate pesticide exposure in the households.



Low wages



Exploitation

TRAUMA



Silenced



Unsafe



Community Based Participatory Action Research

(CBPAR/CBPR)

“A collaborative approach to research that equitably involves all partners in the research process and recognizes the unique strengths that each brings. CBPR begins with a research topic of importance to the community with the aim of combining knowledge and action for social change to improve community health and eliminate health disparities”

- W.K. Kellogg Foundation’s Community Health Scholars Program (2001)



CENTRAL Components of CBAPR

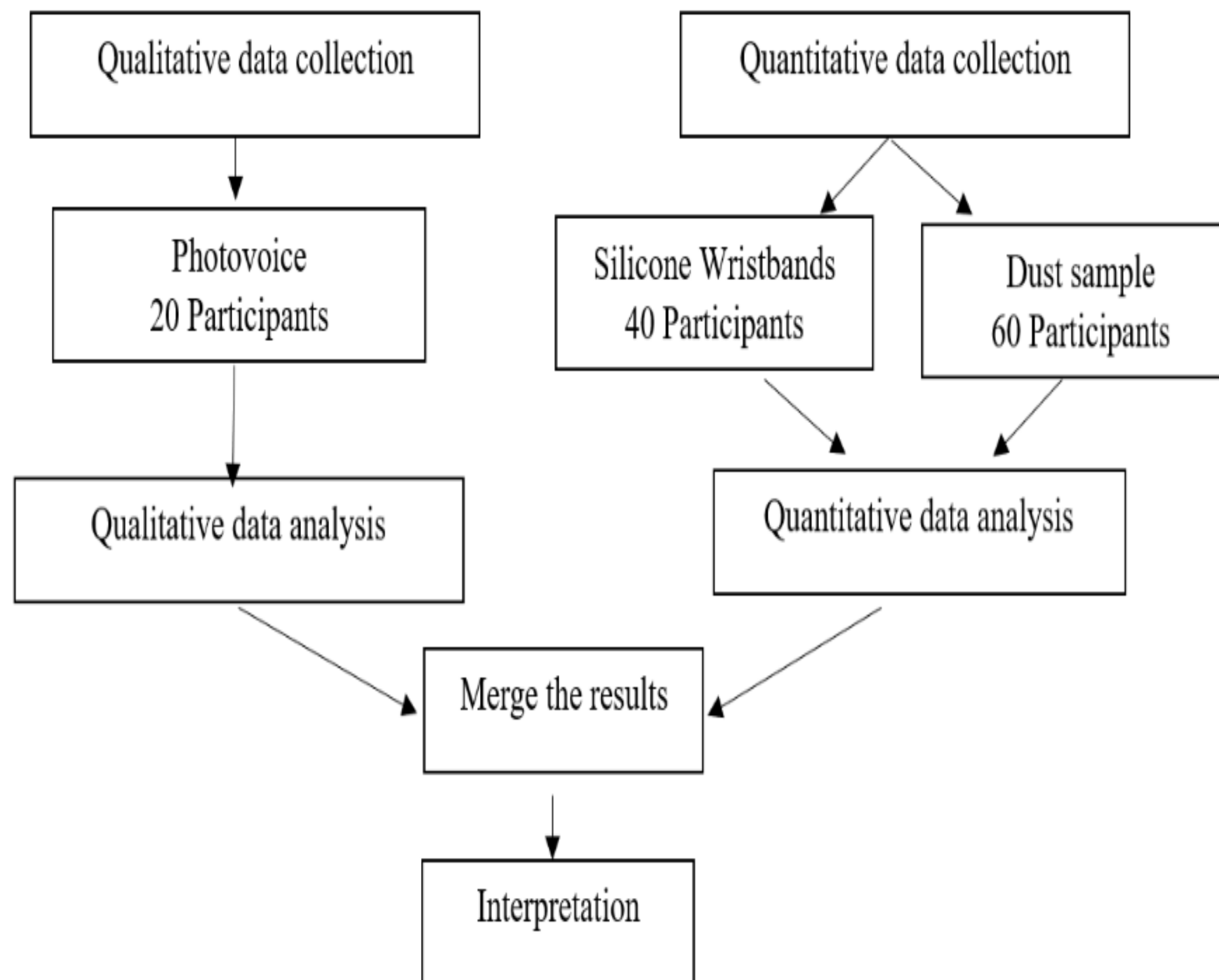
- Recognize community as a **unity of identity**
- Facilitate **collaborative, equitable partnerships, & power-sharing**
- Promote **co-learning & capacity-building** among all partners
- Achieve **balance between research & action** to mutually benefit all partners
- Emphasize **problems of local relevance** using an ecological perspective
- Disseminate findings **with & to all partners**



Coalition Engagement

- Included beedi workers who have lived experience
- Intentionality of trauma-informed CBPAR while establishing coalition and throughout the process
- **Individual-level measures**
 - Create a safe space for them to talk
 - Acknowledge the trauma
 - Address the trauma
- **Coalition-level measures**
 - Recruitment by the key informant from the community
 - Trained community facilitator
 - Paid for community engagement activities

Methods



Inclusion criteria

- Women beedi workers aged 18 years and above.
- Women from different households.
- Willing to undergo an informed consent process.
- Willing to be audio-recorded during the photovoice discussion sessions.
- For the photovoice discussion, individuals with the ability to take photos on a mobile phone or digital camera will be included.

Exclusion criteria

- Women who do not speak Kannada or *Urdu* language.
- Who does not consent to participate in the study.



Community Engagement

- Visited two urban slums in Mysore where *beedi* rolling is the main occupation
- Contacted the community health worker and identified a key person in each community



Community Engagement

- Visited the *beedi* workers homes and discussed their interest in this project
- Group discussion on their concerns and what they would want to address in this study
(research question)



Photovoice Preparation

- Three day “Training of Trainers for Photovoice Methods”
- Dr. Eva Moya, University of Texas
- Trained the research staff at PHRII
- One-day Photovoice training for 20 beedi workers



Table 1. Overview of photovoice timeline and activities

Week	Activity
Week 1	Photovoice Training
	<input type="checkbox"/> Introduction to photovoice and project goals
	<input type="checkbox"/> Photographic techniques
	<input type="checkbox"/> Confidentiality and ethics
Week 2	Photo collection
	<input type="checkbox"/> Each participant will collect five occupational health related theme photos and share them with research staff
	Discussion 1
	<input type="checkbox"/> SHOWeD form completion
	<input type="checkbox"/> Participant presentations
Week 3	Photo collection
	<input type="checkbox"/> Each participant will collect five occupational health related theme photos and share them with research staff
	Discussion 1
	<input type="checkbox"/> SHOWeD form completion
	<input type="checkbox"/> Participant presentations
Week 4	Photo collection
	<input type="checkbox"/> Each participant will collect five occupational health related theme photos and share them with research staff
	Discussion 1
	<input type="checkbox"/> SHOWeD form completion
	<input type="checkbox"/> Participant presentations
	<input type="checkbox"/> Group discussion
	Wrap-up and celebration
	<input type="checkbox"/> Comprehensive slideshow with all photos and final narratives will be shared with the group
	<input type="checkbox"/> Evaluation survey

Table 2. SHOWeD form questions (from Wang, 2003)²³

S	What do you SEE?
H	What is really HAPPENING?
O	How does this relate to OUR life?
W	WHY does this situation, concern, or strength exist?
e	What can we do to EDUCATE others about this situation, concern, or strength?
D	What can we DO about it?



- 20 participants in 3 groups (6-7 participants in each group)

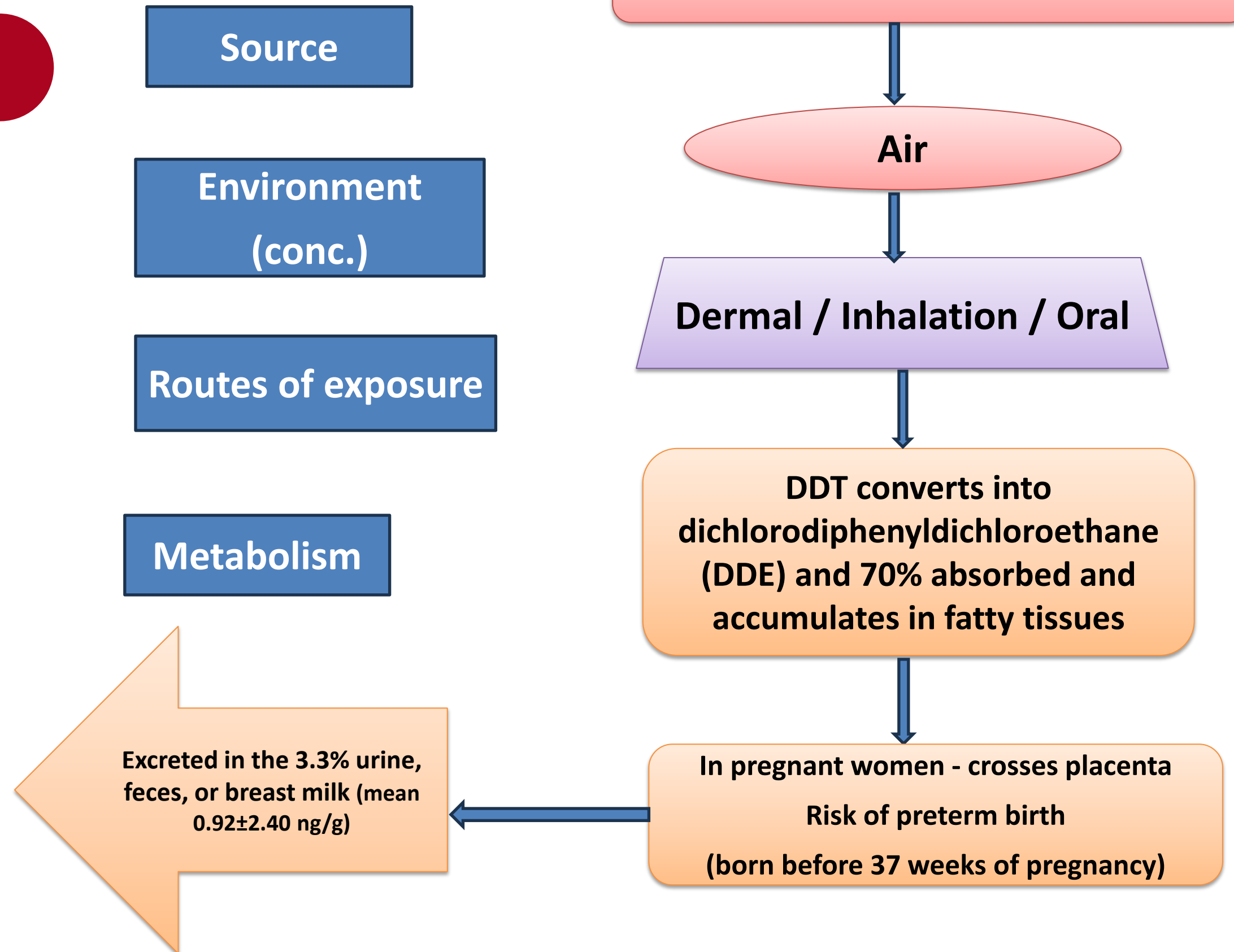


- Create a safe space for them to talk
- Incentives for each visit



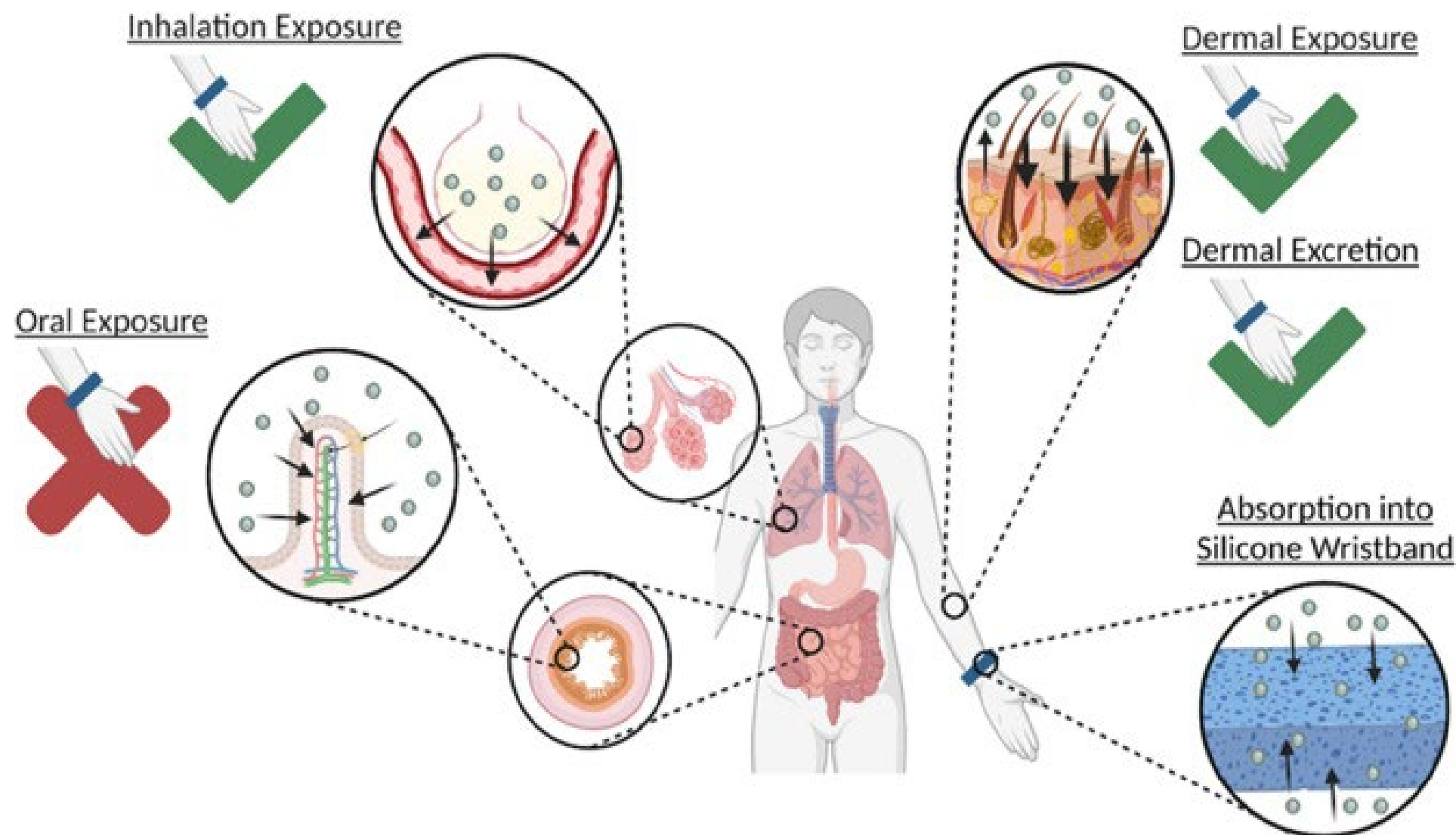
Exposure Diagram

DDT exposure among beedi workers



- Affects male and female reproductive organs.
- Causes a faulty signaling in the neuroendocrine system during the critical developmental process

SILICONE WRIST BAND



- Composed of hydrophobic polymers.
- Absorb via diffusion.
- Wear continuously for seven days.
- Wrap in foil and place them in Ziplock bag and stored in a -20⁰C freezer.

source: Samon et. al., (2022)

48

Cd

cadmium

33

As

arsenic

24

Cr

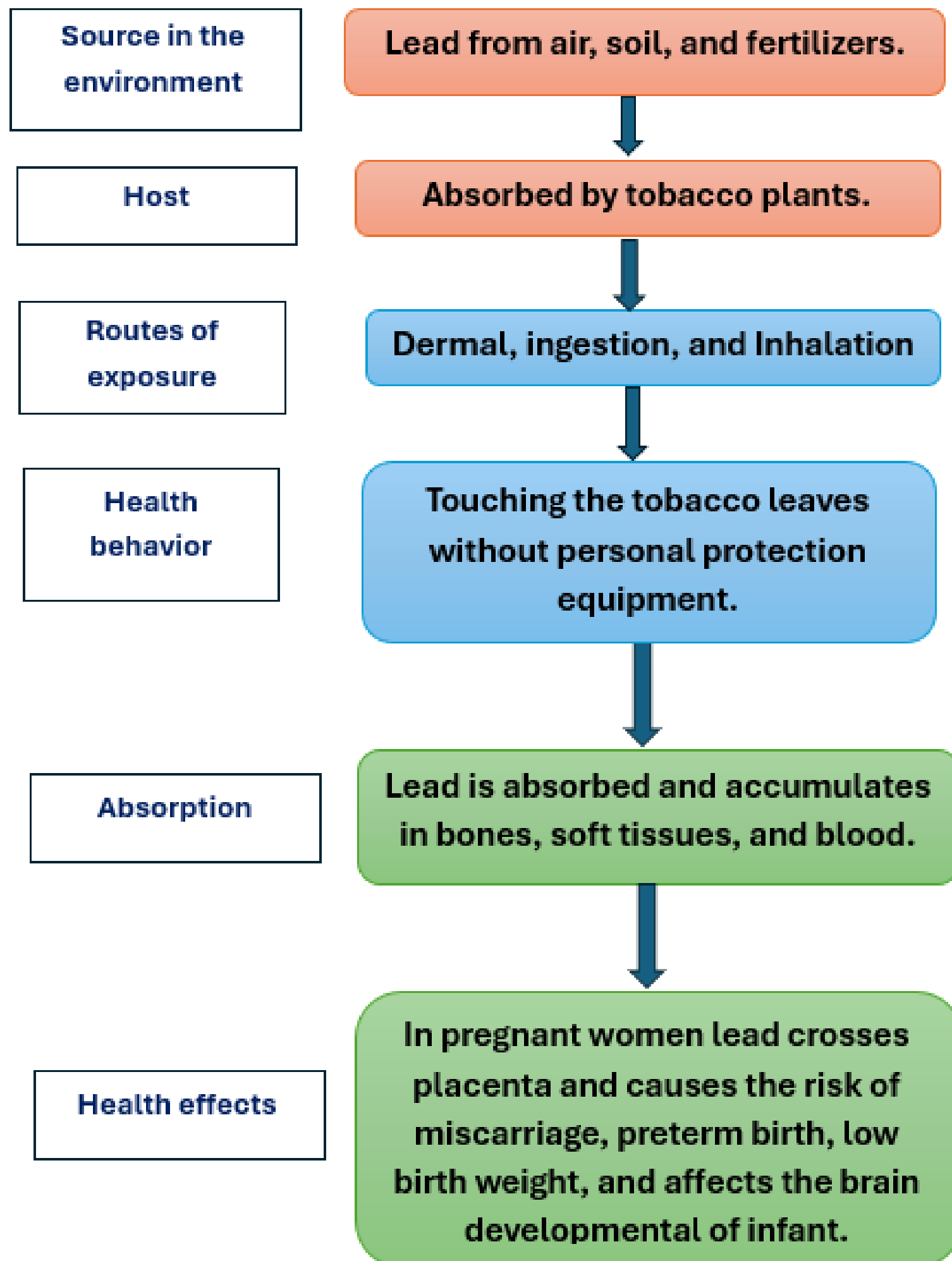
chromium





Exposure pathway of occupational exposure of lead among beedi workers

- 44.2 $\mu\text{g/g}$ lead in palms of beedi workers (CDC ref dose 3.5 $\mu\text{g/g}$)
- Any amount of lead in human body is a contaminant





DUST SAMPLE COLLECTION

- 30 Beedi workers and 30 non-beedi workers.
- All the samples were collected from entire the living room and bedroom.
- Vacuumed and collected using paper bags.
- 40 minutes or until a sufficient sample of 5 gms is collected.
- The paper bags were wrapped in foil and stored in a Ziplock bag at -20°C.



DATA ANALYSES

- **Photovoice**
 - Thematic analysis - MAXQDA software
- **Silicone wristbands (pesticide residues) and Dust samples (heavy metals)**
 - Mann-Whitney U test and Spearman correlation analysis – STATA software
 - Principal component analysis – STATA software

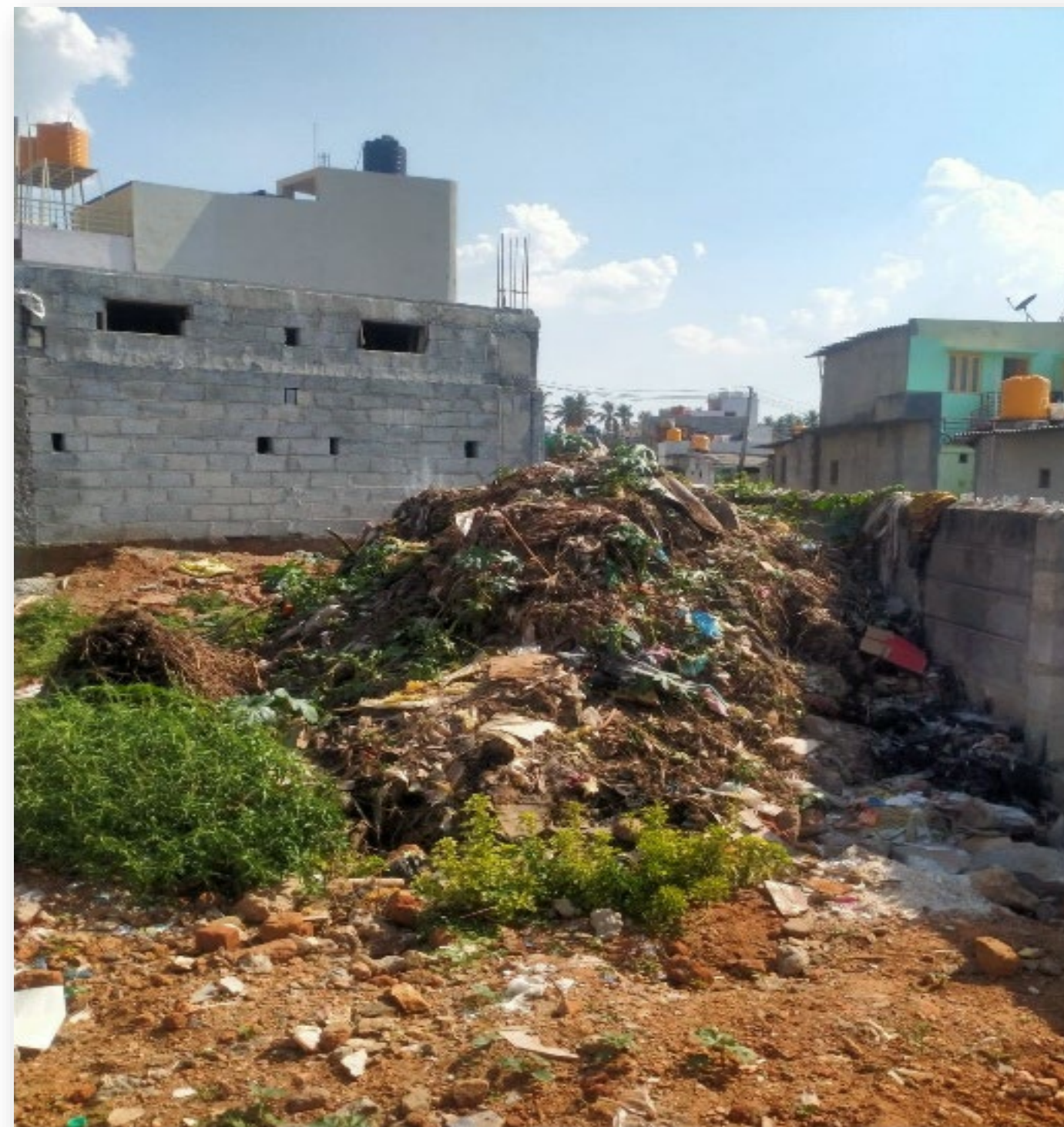


Community

“Binna darvasa”
Without a door



“Gandhagi”
Garbage



Health Problems



“Dard bhi hai kaam bhi hai”
Pain too, work too

“I have pain in my wrist while working, even in pain, I keep working. I use a painkiller or analgesic spray for my pain, I tie a cloth after applying the spray to keep my hand warm. This provides some support to my wrist while working.”

Occupational constraints

“Khubsuzarti zaroori hai” Beauty is needed

“The beedi we roll should look clean and neat otherwise it will be rejected. The leaf has to be cut neatly, if not around 150 - 200 beedis will be removed from 1000 beedis. The payment will also be cut for the rejected beedis. We lose our wages even if the tendu leaf has holes.”



Access to healthcare

“Kamai kham karcha zyada”
Less earnings more expenses



“I have been rolling beedi for 50 years. I have diabetes, so more medical expenses but I get less payment from beedi rolling. If I have to travel to a government hospital I have to pay Rs. 30 auto fare, but for beedi hospital I should pay Rs. 300 auto fare (travel expense). Beedi hospital is very far, I want the medical facilities to be at near my house.”

Interpersonal relations

“Padhai ki ladaai” Fighting about teaching

“My husband and I have arguments over my lack of involvement in teaching our children. He scolds me for not putting aside my beedi work, he wants me to prioritize our children’s education. Sometimes physical violence also occurs. So, I try to complete my work early to devote my time to teaching my children.”



Societal inequality

“Ameeri Gareebi”
Rich Poor



Jobs not sustainable

“Beedi se baiter”
Better than Beedi



Occupational problems

Ergonomic

Violence

Exposure via
dermal
contact

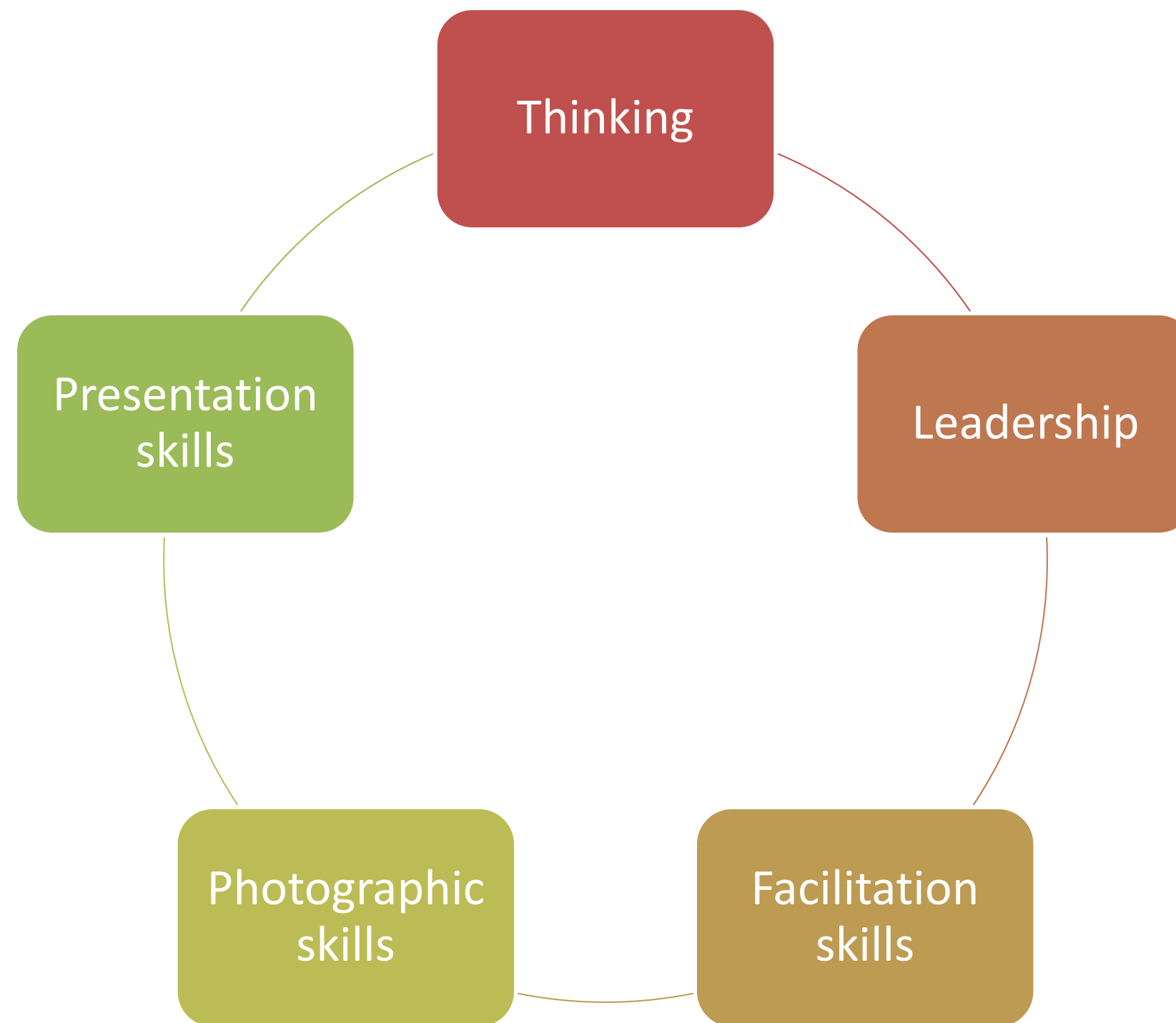
Inhalation

Accidental
ingestion

Psychosocial



Photovoice empowerment measures





Recommendations

- Strong **policy measures** are needed on the supply side of the tobacco industry.
- Exploited by the tobacco industry for low wages.
- Need to protect the vulnerable worker's health and provide **health care benefits**.
- Need to **increase registration** of the beedi industry for better administration of taxes and prevention of exploitation of the beedi workers.
- **Education and awareness** on the health effects of occupational tobacco exposure.
- **Skill building and alternative employment**.



THANK YOU

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