CHAPTER V

PRESENTATION

On 6th March, 1998 I had presented my thesis to examination committee. I presented my overall view of my thesis study on the topic, "Motor vehicle emissions: A major cause of lead poisoning among public school children of Kathmandu valley, Nepal."

Mainly, presentation was divided into two parts - Essay and Proposal. In the essay part, I had presented about the board aspect of environmental problem which is created by motor-vehicle emissions. By analysing all factors, I had found lead pollutant as a serious problem in Kathmandu valley of Nepal. So I had concluded in essay part to study for the determination of lead exposure level. In proposal part, I have proposed the strategy to determine the lead exposure level among public school children of Kathmandu valley and Gorakhkali municipality of Gorkha, Nepal for comparision.

Copies of presentation (overhead transparencies) are as follows:

MOTOR VEHICLE EMISSIONS:

A MAJOR CAUSE OF LEAD POISONING AMONG PUBLIC SCHOOL CHILDREN OF KATHMANDU VALLEY, NEPAL

General Purpose of the study:

To determine the Lead (Pb) exposure to the public school children in Kathmandu valley of Nepal.

ESSAY

Issue:

Does the existed level of air pollution affect the public health of Kathmandu valley ?

Reasons and Evidence:

*** The existence of PM10 dust particulate is 2-6 times higher than normally accepted level 70 Mg/m3 set by WHO, (NESS,1994)**

*** Geographical structure - Valley**

*** Use of leaded fuel - 0.58gm/lit., yearly 15 tonnes lead (Pb), (NESS,1994)**

*** Rapidly rise in vehicle number - 9000/ year in valley,**

*** Number of vehicles use leaded fuel - 95,000 out of 110,000 in Ktm. Valley,**

*** Poor condition of city road - 394KM.: (B-255,G-95 & E - 44), (CBS,1995)**

*** Road is not improved and extended as rise in vehicle registration, (Road/Vehicle ratio in Bagmati zone)**

Year	Ratio of road/vehicle
1991	1:44
1992	1:49
1993	1:50
1994	1:55
1995	1:59
1996	1:63

*** Old/Poor condition of vehicles (Emission tested till June,1997)**

Tested - 41,952; Passed - 25,554

Retested - 2,719;Passed - 625

Conclusion:

Hence,

It is likely that the Lead pollutant might be more serious problem than others in Kathmandu valley, which mainly affects to the children by permanently impair the learning ability.

PROPOSAL

Research Question

What is the prevalence rate of lead (Pb) poisoning in exposed and non-exposed area of Nepal ?

General Objective of the Study:

To determine the Lead (Pb) exposure among public school children living in Kathmandu valley and Gorakhkali municipality of Gorkha, Nepal.

Specific Objectives:

1. To measure the blood lead level (PbB/dl) of childrens age 6-10 in both exposed and non-exposed area,

2. To determine the Lead (Pb) concentration in ambient air of exposed area,

3. To compare the blood lead level between exposed and non-exposed area,

Study Design:

Cross sectional

Exposed - Sample will be taken from the Public school of Kathmandu valley,

Non exposed - Sample will be taken from pollution free area, i. e.,Gorakhkali municipality,

Target Population

All public school children of Kathmandu valley age 6-10 years (grade 1-5),

(In 1992, 201,708 childrens were studied in class 1-5 of 1166 public schools),

Prerequisite for the sample childrens are as follows:

A. Children should be in the age group of 6-10 yrs.

B. They should have studied in the same school since last 6 months,

Sampling Procedure: Multi-stage sampling,

Districts of Kathmandu valley	Total children (1-5)	Student proportion (%)	No. of Sample school	Student x grade x school	Total sample student
Kathmandu	116,182	57.60	4	22 x 5 x 4	440
Lalitpur	55,036	27.30	2	22 x 5 x 2	220
Bhaktapur	30490	15.12	1	22 x 5 x 1	110
Total	201,708	100 %	7	22 x 5 x 7	770

Proposed Program,

1. To receive consent from parents to take out and measure the blood lead level (PbB/dl),

2. To implement questionaire to parents about their children,

3. Blood lead level (PbB/dl) measurement in both exposed and non exposed group,

4. Analysis of data collection

5. Publicise the exposure of lead level by comparing blood lead level between exposed and non-exposed area,

Description of Blood Lead Level by Various Variables

		Children with PbB < 10 μg /dl		Children with PbB > 10 μg /dl	
Variables	Total	Number	% of Total	Number	% of Total
Gender					
Age					
Grade					
Urban					
Rural					
Occupation					

Analysis of Total Sample Children

Blood Lead Level	>10μg/dl % of total	<10μg/dl % of total	Total
Urban	a	b	770
Rural	c	d	770
Total	a+c	b+d	1540

Data Analysis Methods

*** Risk Ratio = Incidence among exposed /**

Incidence among non-exposed,

*** Odds Ratio = Odds Ratio is a measure of the strength of the association between risk factor and outcome. It is closely related to relative risk.**

$$\text{Odds Ratio} = ad / bc$$

*** Chi-Square ($\chi 2$) test,**

$$\chi 2 = \Sigma(O - E)2 / E$$

Where, O = Number of particular blood lead level both in exposed and non-exposed areas,

E = Total No. of children of particular area and or group x Total number of children having PbB/dl > or < 10 μg/dl / Grand total

Effects of Inorganic Lead on Children and Adults

Children	(μg PbB/dl)	Adults
Death	150	
	100	Encephalopathy
Encephalopathy, Nephropathy, Frank Anemia, colic		Frank Anemia Decreased Longevity
	50	Decreased hemoglobin synthesis
Decreased hemoglobin synthesis	40	Peripheral Neuropathies Infertility (men), Nepropathy,
Decreased Vitamin D Metabolism	30	Increases systolic blood pressure (Men), Decreases hearing acuity,
		Increases Erythrocyte Protoporphyrin (Men),
Decreases nerve conduction velocity,	20	
Increases Erythrocyte Protoporphyrin, Decreases vitamin D metabolism, Developmental toxicity,		Increases Erythrocyte Protoporphyrin (women)
Decreases IQ, Hearing and Growth,	10	Increases hypertension,
Transplacental Transfer		

Adapted from ATSDR, Toxicological Profile for Lead (1989),

Standards and Regulations for Lead

The number of U.S. federal standards and regulations reflect the extent to which lead is considered a public health problem. In some cases, the lead levels are mandated; in others, they are only recommended standards.

Agency*	Focus	Level	Comments
CDC	Blood	10 μg/dl	Advisory; level of concern for children†
OSHA	Blood	50 μg/dl	Regulation; medical removal from exposure,
OSHA	Air	50 μ g/m3 30 μ g/m3	Regulation; PEL§ (General industry) Action level
ACGIH	Air	150 μ g/m3	Advisory; TLV/TWA ¶ (Under revision)
EPA	Air	1.5 μ g/m3	Regulation; 3-month average,
CDC (NIOSH)	Air	100 μ g/m3	REL**
EPA	Water	15 μg/l	Action level
FDA	Food	100 μ g/day	Advisory
CPSC	Paint	600ppm (0.06%)	Regulation; by dry weight

Interpretation of Blood Lead Test Results and Follow up Activities:Class of Child Based on Blood LeadConcentration

Class	PbB Concentration	Comment
I	≤ 9	A child is not considered to be lead poisoned.
IIA	10-14	The presence of many children (or a large proportion of children) with blood lead levels in this range should trigger communitywide childhood lead poisoning prevention activities. Children in this range may need to be rescreened frequently.
IIB	15-19	A child should receive nutritional and educational interventions and more frequent screening. If the blood lead level persists in this range, environmental investigation and intervention should be done.
III	20-44	A child should receive environmental evaluation and remediation and a medical evaluation. Such a child may need Pharmacologic treatment of lead poisoning.
IV	45-69	A child needs both medical and environmental interventions, including chelation therapy.
V	≥ 70	A child with this class of lead poisoning is a medical emergency. Medical and environmental management must begin immediately.

Source - ATSDR, Case Studies in Environmental Medicine, Lead Toxicity,Sep,1992 . Page - 15.