

**Pregnancy Outcomes and Course of  
Labor among Mothers Residing Near Power  
Line Station Generating Electromagnetic Field.**

Presented by

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# Introduction

- **Electromagnetic fields (EMFs) are emitted from electric power lines, electrical appliances and consumer products found in homes and offices. Exposures to extremely low frequency (ELF) electric and magnetic fields (EMFs) are an essential part of modern life.**



# Introduction (cont,)

- **Magnetic fields are more of concern for health because unlike electric fields, they pass through the body, so that about 27 countries currently conducting EMFs researches particularly because of the controversial biophysical mechanisms by which these extremely low-energy fields may affect biological systems.**

# Introduction (cont,)

- The most common man-made EMFs to which people are exposed continuously are those arising from the use of electrical power (50-60 Hz) .
- The electromagnetic field is the combination of electric and magnetic fields in the environment.



# Introduction (cont,)

- **the alternating electric current (AC) is the flow of electrons with changing of its direction and magnitude with time. While, direct electric current (DC) is the flow of electrons without changing of its direction and magnitude with time (commonly-used term for all static magnetic fields, including geomagnetic fields and those originating from permanent magnets).**

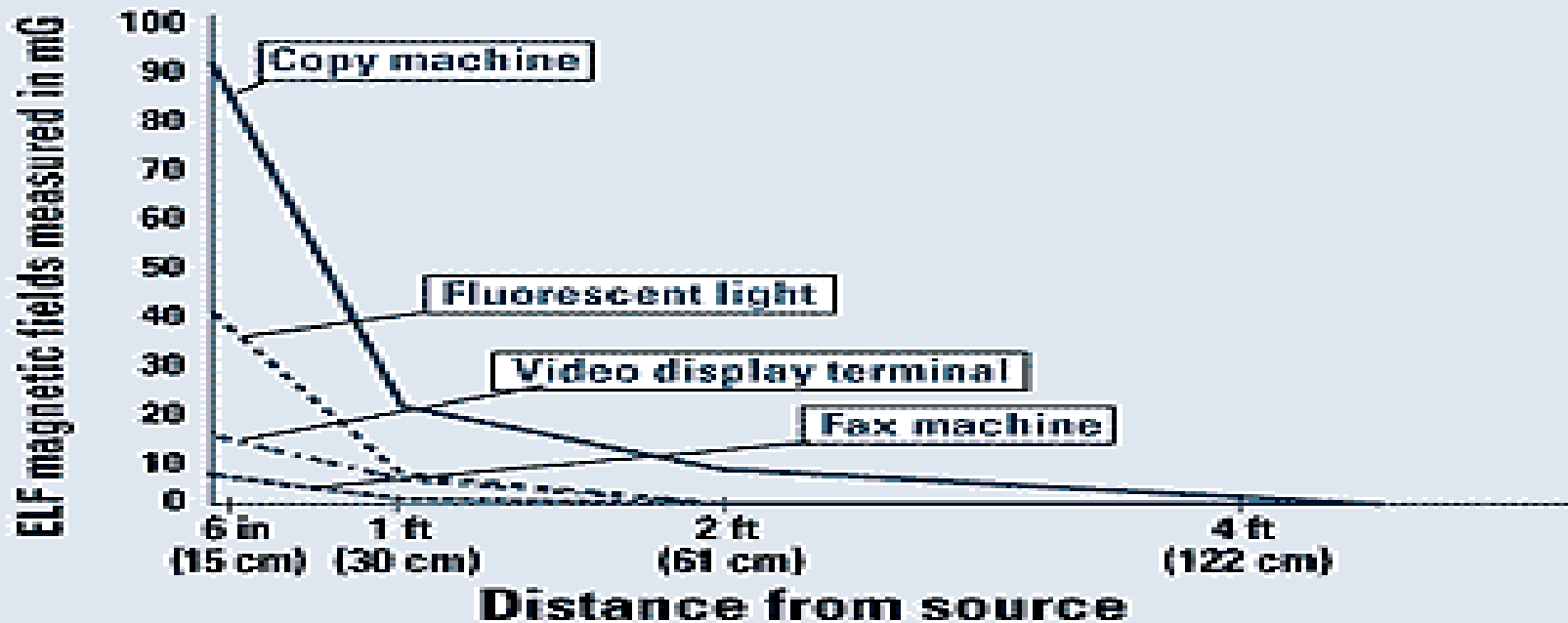
# Introduction (cont,)

- **AC is associated with AC magnetic field and the same for DC. It is important to mention that, EMFs are strongest at their source and weaken with distance.**



# Strength of EMF Diminishes Quickly As Distance from the Source Increases

**EMF Spot Measurements Taken at Various Distances**



Source: *EMF in Your Environment*, 1992

# Introduction (cont,)

- \* Wherever electric power is used, electric and magnetic fields are present. Electric appliances emit electric fields even when they are turned off as long as they remain plugged into electrical sockets.**



# Introduction (cont,)

- **Until a few years ago, the electric and magnetic fields around power lines, electric motors and household appliances were thought to be harmless. Nevertheless, scientists changed their opinions based on new studies on humans and animals, which suggested that EMFs have biological effects, and that they may foster a number of medical problems, including cancer and miscarriage.**



# Introduction (cont,)

- **People can sense an electric field of more than about 20 kilovolts/meter (kV/m) as a slight tingling sensation on their skin. This level can be found underneath high voltage power lines. On the other hand, most people cannot feel the presence of AC magnetic fields except at extraordinarily strong levels.**



# Significance

- **Several studies on possible effects of power frequency electromagnetic fields on human health have been carried out, but most attention has been given to the occurrence of cancer among children, in particular leukemia and cancers of the nervous system.**



# Significance (cont,)

- Previous studies on the health effects of exposure to EMFs had provided contradictory results. Thus, there is a need for further research in this area in order to exclude whether the exposure to EMFs is a health hazard in general and leads to adverse pregnancy outcomes in particular.



# Aim of the Study

**This study aims at examining the impact of residence near power line station generating electromagnetic fields on pregnancy outcomes and course of labor in polluted area as (EL Kanater El Khiria) as compared to data collected from non-polluted area as (El Kasr El Aini).**



# Materials and Methods

## Design:

**A correlational design was adopted for this study, using prospective and retrospective approaches.**



# Materials and Methods (cont,)

## Sample:

- A total of 300 women was recruited for this study in accordance with criteria of selection which were:

women in the reproductive age, no family history of any disease, free from any medical diseases (non-polluted area). In addition to, residing near the power line station by 1Km or less and for at least 5 years (polluted area)



# Materials and Methods

- The sample then was divided into two groups 150 each (prospective & retrospective).
- Each group was then subdivided into two groups 75 each (polluted & non-polluted areas).



# Materials and Methods (cont,)

## Settings:

Four settings were included in the study:

A) for the prospective group: two hospitals were used.

1) Department of Obstetrics and Gynecology at El Manial University Hospital.



# **Materials and Methods (cont,)**

**2) Department of Obstetrics and Gynecology at El Kanater El Kairia Central hospital.**

**B) for the retrospective group: two MCH centers were used.**

**3) Misr El Kadima MCH center.**

**4) El Kanater El Kairia MCH center.**



# Materials and Methods (cont,)

## Tools:

- 1) Interviewing questionnaire for both prospective and retrospective groups (developed by the investigator).
- 2) Labor and delivery assessment sheet for the prospective group (developed by the investigator).
- 3) Partograph for the prospective group.



# Materials and Methods (cont,)

4) Neonatal assessment sheets for the prospective group including:

A) Apgar Score.

B) Ballard Scale to assess the physical and neuromuscular maturity of the neonate.

5) Guass meter to measure the level of radiation in the subjects' homes



# Materials and Methods (cont,)

## Procedure:

- \* An official permission was obtained from all the study settings.
- \* Full explanation for mothers about the aim, nature, importance, benefits and the procedures of the study was done by the investigator, then oral permission was taken from mothers who met the study criteria.



# Materials and Methods (cont,)

- \* The level of radiation was measured in the subjects s' houses using a Guass meter.

- \* Prospective Approach:

Data was collected through interviewing the mothers during the admission to labor and delivery unit, assessing the mother and her fetus during labor and delivery and assessing the maternal and neonatal condition during the first few hours after delivery.



# Materials and Methods (cont,)

## \* Retrospective Approach:

Interviewing with the mothers in the MCH centers to collect data regarding to socio-demographic status, medical history, family history and obstetrical profile.



# Results

Mean age of mothers in the retrospective group

Polluted Area		Non-polluted Area	
Mean	$\pm$ SD	Mean	$\pm$ SD
25.12	5.28	27.02	5.12

# Results (cont,)

Mean age of mothers in the prospective group

Polluted Area		Non-polluted Area	
Mean	$\pm$ SD	Mean	$\pm$ SD
25.40	5.06	25.58	4.84

# Results (cont,)

- **The age range of the sample is between 17-35 years.**
- **There were no statistically significant difference between prospective and retrospective groups in relation age, which denotes homogeneity between the study groups.**



# Results (cont,)

- There were no statistically significant differences between prospective and retrospective groups in relation to educational level, occupation of the subject, occupation of the husband, smoking habits, family income, electrical devices at home, number of rooms and houses' areas which denotes homogeneity between the study groups.



# Results (cont,)

The level of radiation at the houses of the polluted group (in mG) by using Guass meter

<b>Polluted Areas</b>			
<b>AC</b>	<b>AC peak</b>	<b>DC</b>	<b>DC peak</b>
9.00	9.50	2.35	3.00

# Results (cont,)

The level of radiation at the houses of the non-polluted group (in mG) after using Guass meter

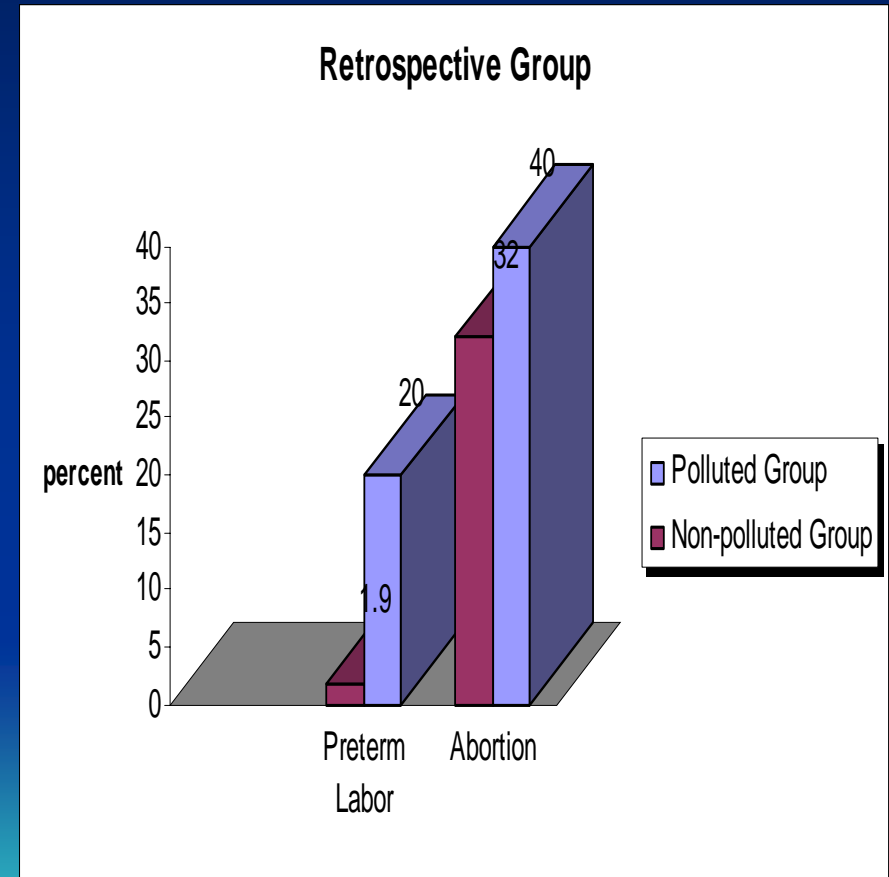
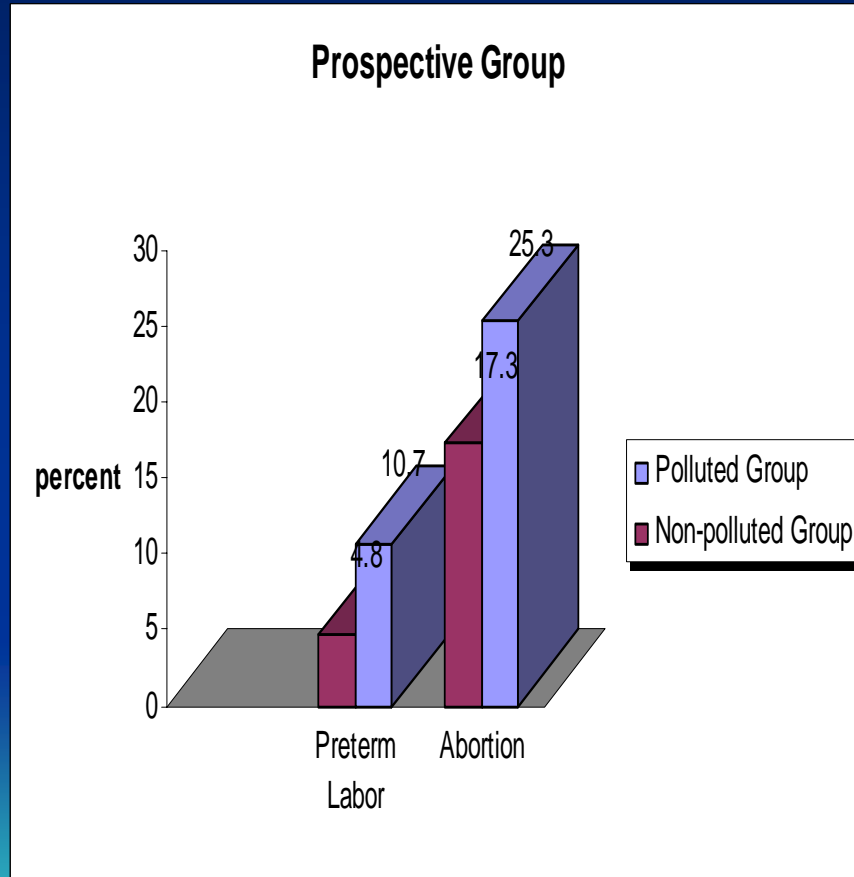
<b>Non-polluted Areas</b>			
<b>AC</b>	<b>AC peak</b>	<b>DC</b>	<b>DC peak</b>
0.00	0.00	0.04	0.05

# Results (cont,)

**The previous measurements indicate that, the level of EMFs at houses away from the power line stations are still within the safe limits, while the level of EMFs at houses near the power line stations exceeds safe limits.**



# Maternal Outcomes of the previous Pregnancy among Retrospective and Prospective Groups



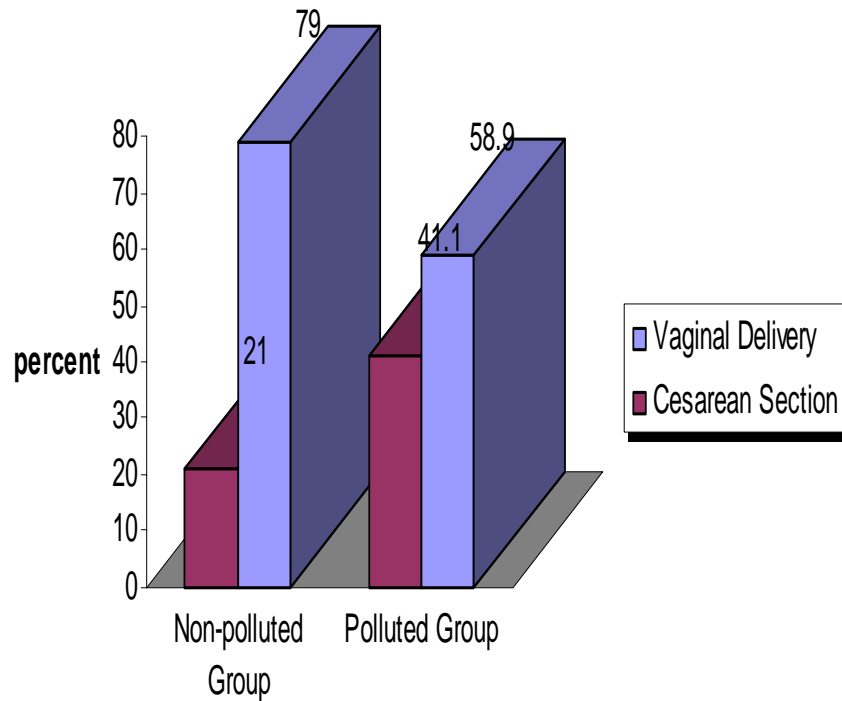
# Maternal Outcomes (cont,)

**There was a statistical significant difference between polluted and non-polluted groups in relation to abortion and preterm labor, which may be caused by the pollution with EMF.**

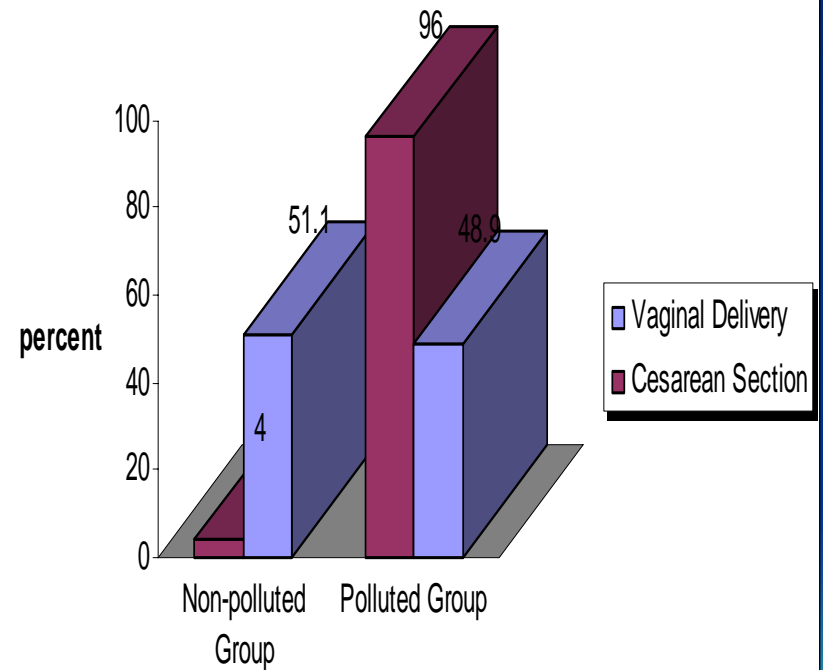


# Maternal Outcomes (cont,)

## Prospective Group



## Retrospective Group

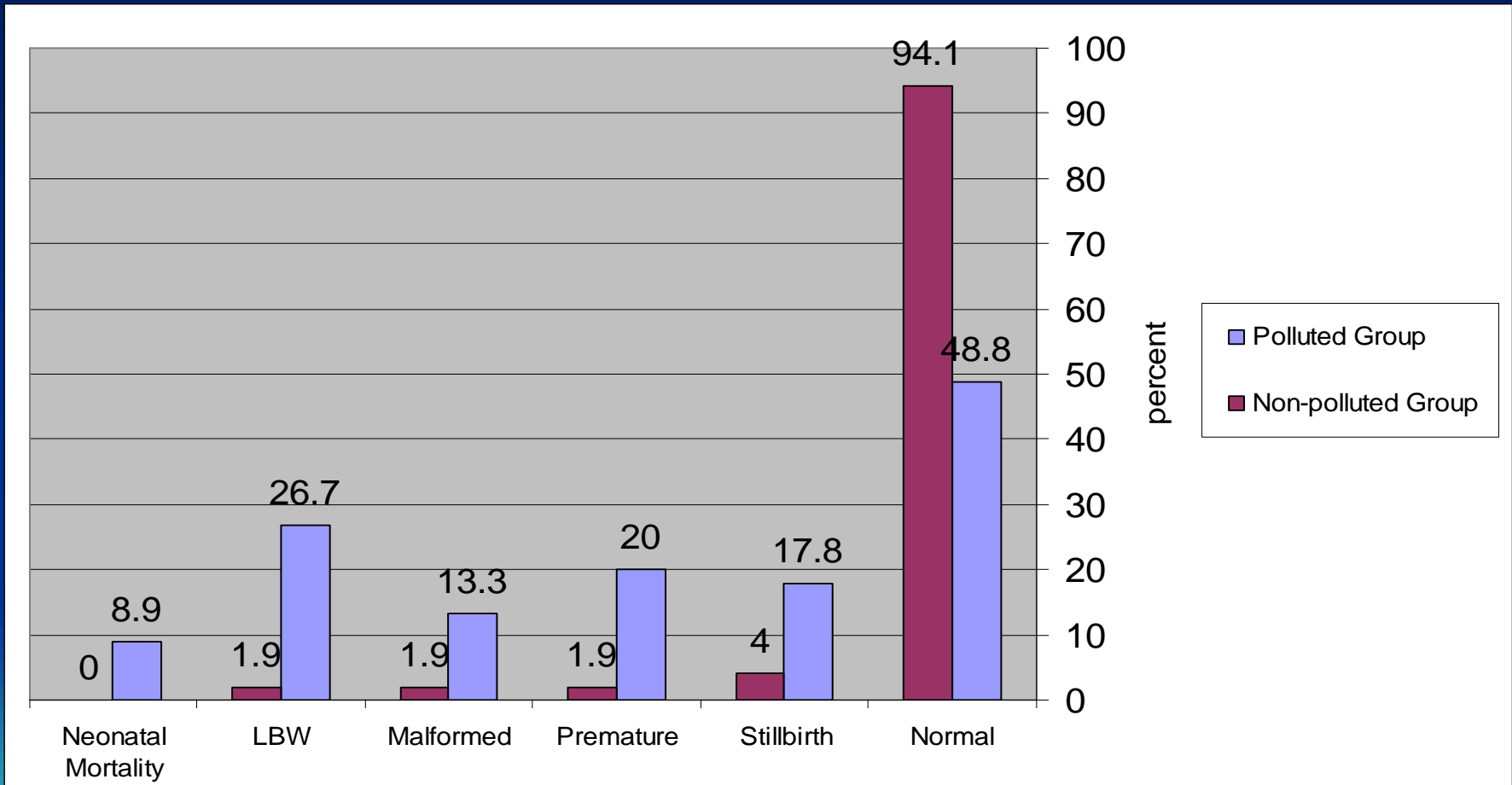


# Maternal Outcomes (cont,)

**There was a statistical significant difference between polluted and non-polluted groups in relation to mode of delivery, which may be caused by the pollution with EMF.**



# Previous Neonatal Outcomes among Retrospective Group

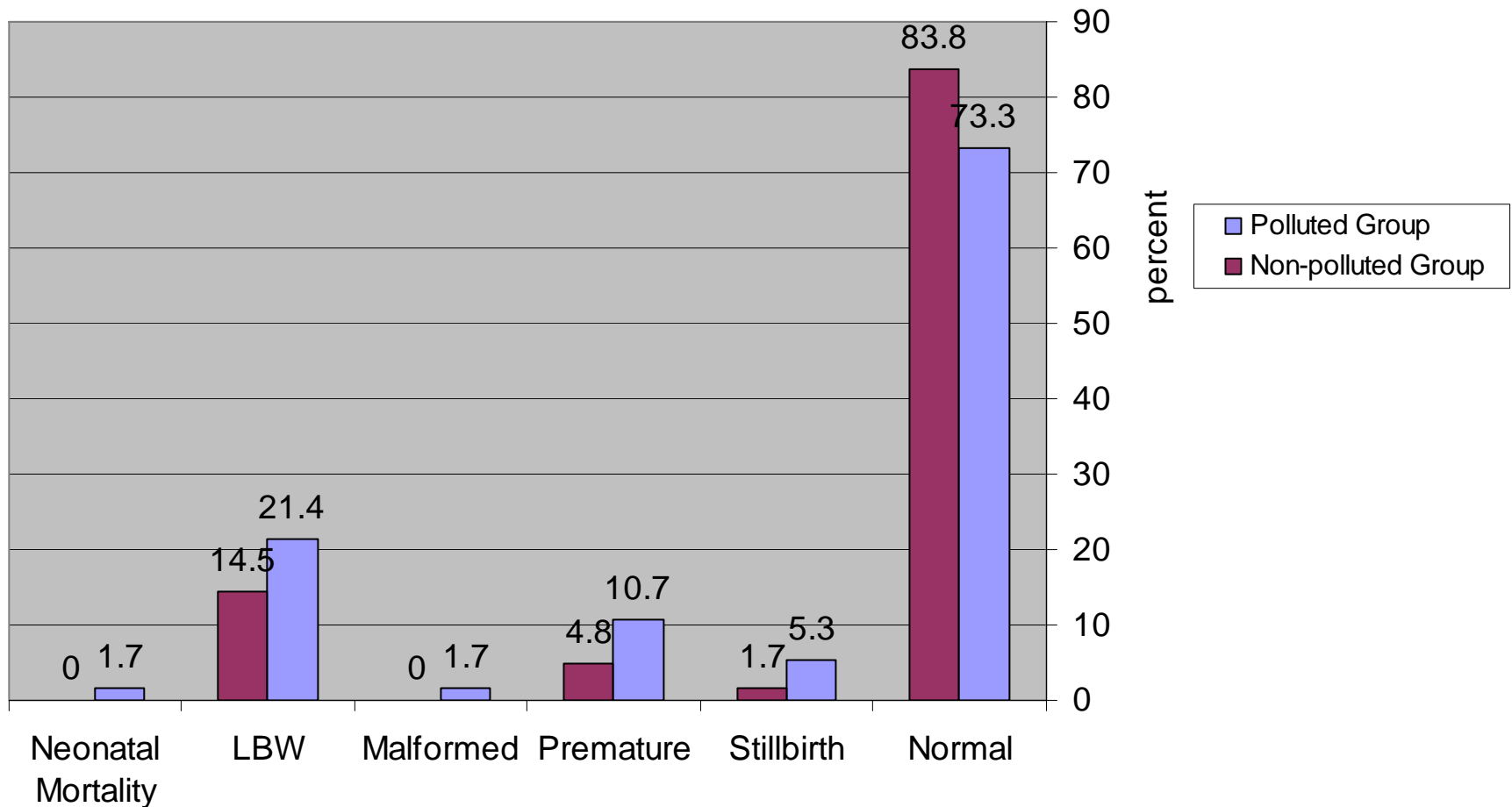


# Previous Neonatal Outcomes (cont,)

**There was a statistical significant difference between polluted and non-polluted groups in relation to neonatal outcomes of the previous delivery, which may be caused by the pollution with EMF.**



# Previous Neonatal Outcomes of the Prospective Group

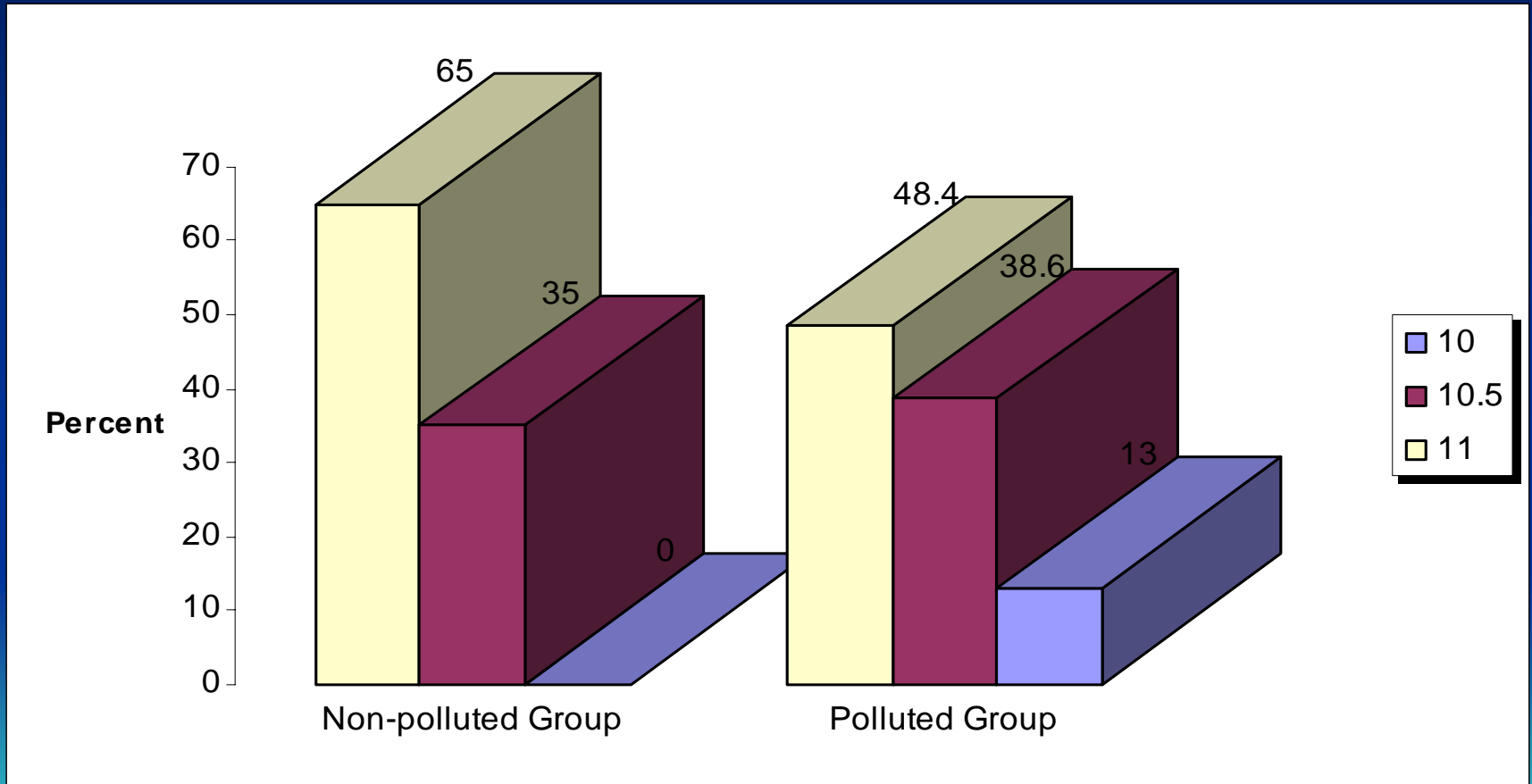


# Previous Neonatal Outcomes (cont,)

**There was a statistical significant difference between polluted and non-polluted groups in relation to neonatal outcomes of the previous delivery, which may be caused by the pollution with EMF.**



# Hemoglobin Level among mothers of the prospective Group

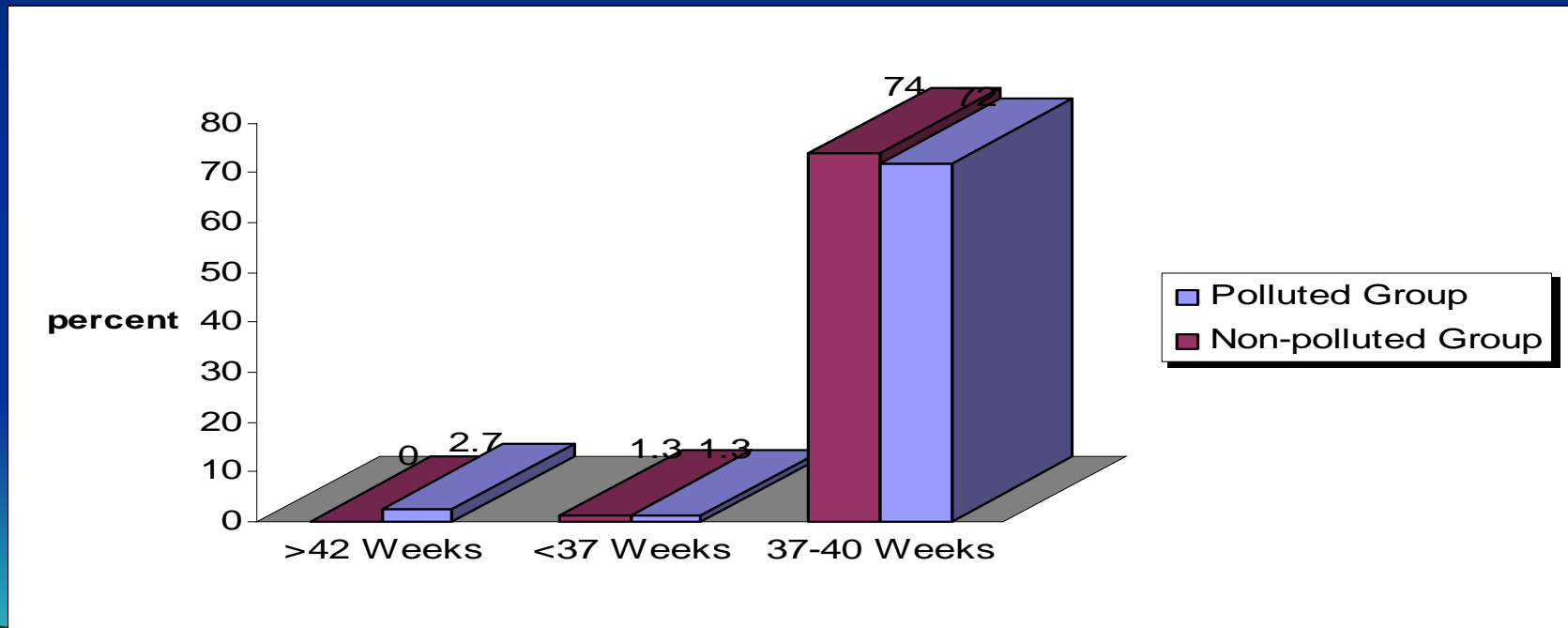


# Maternal and Fetal Assessment during the Present Delivery

- As regards maternal vital signs, fetal heart rate, uterine contractions (frequency, duration and intensity), cervical dilatation, augmentation of labor and presence of complications during or after delivery, no statistical significant differences were found between polluted and non-polluted groups.

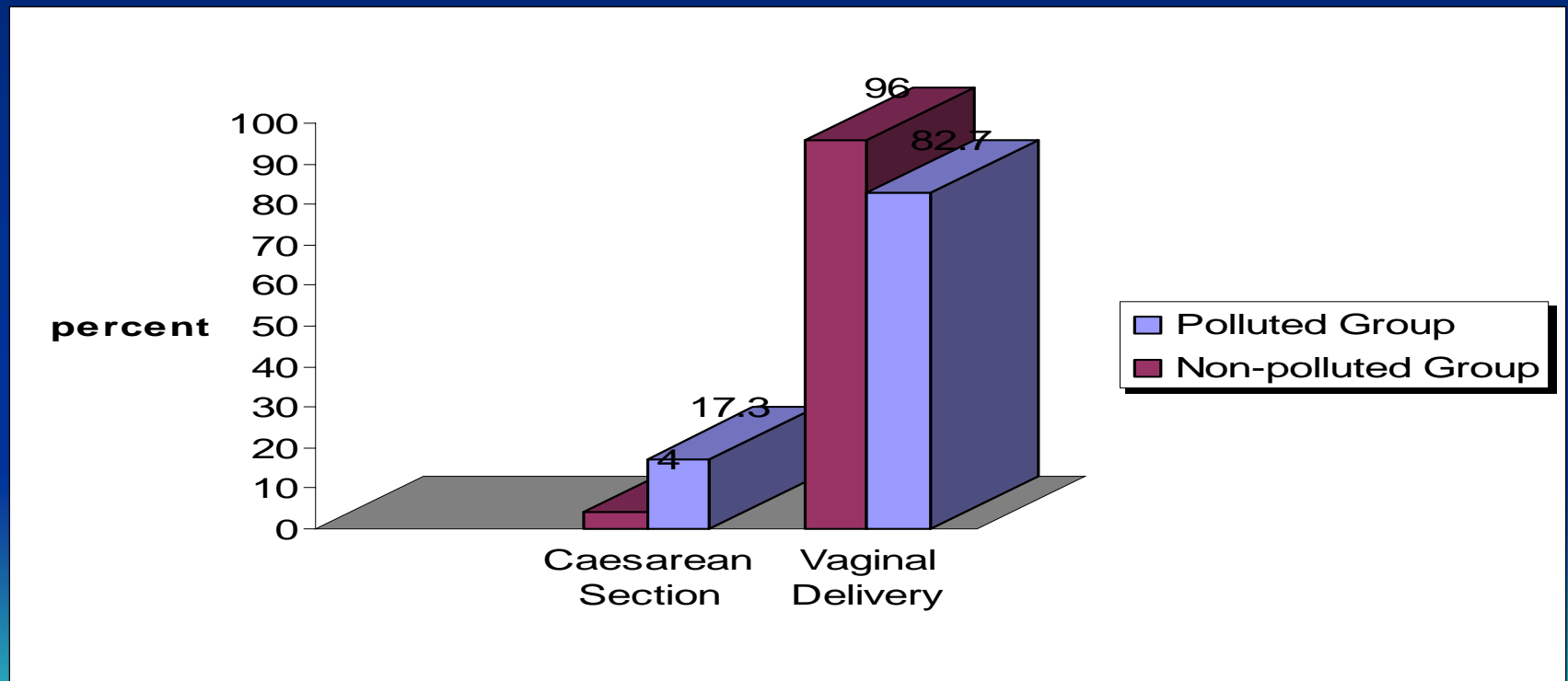
# Maternal Outcomes in the Present Delivery (cont,)

Distribution of Mothers in the Polluted and Non-polluted Groups According to their Gestational Age at the Time of Delivery



# Maternal Outcomes in the Present Delivery (cont,)

Distribution of the Prospective Group (polluted and non-polluted) by their Mode of Present Delivery



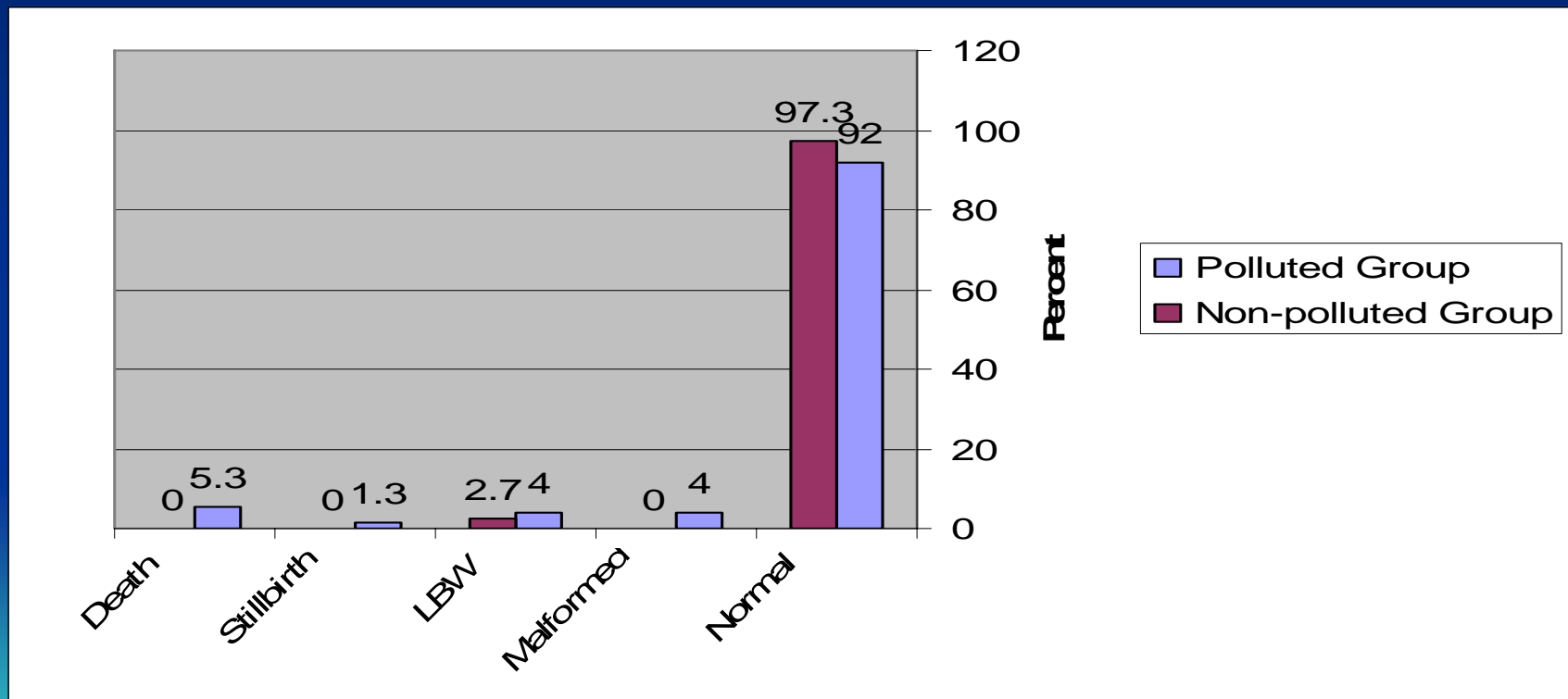
# **Maternal Outcomes in the Present Delivery (cont,)**

**There was a statistical significant difference between polluted and non-polluted group in relation to gestational age at the time of delivery and mode of present delivery. On the other hand, no statistical significant differences were found between polluted and non-polluted group in relation to duration of first, second and third stages of labor**



# Neonatal Outcomes in the Present Delivery (cont,)

Distribution of the Polluted and Non-polluted Groups by their Neonatal Condition at the Present Birth



# Neonatal Outcomes of the Present Delivery

- There was a statistical significant difference between polluted and non-polluted groups in relation to Neonatal Condition at the Present Birth. While, no statistical significant differences were found between polluted and non-polluted groups in relation to Apgar score at first and fifth minute after delivery, anthropometric measurements and maturational assessment (Ballard scale) of the newborn.



# Conclusion

- This study concluded that EMFs generated from power line stations increase the incidence of abortion , preterm labor, still birth, neonatal congenital anomalies , neonatal low birth weight, neonatal mortality , maternal anemia , IUFD (Intrauterine fetal death ) and increase the incidence of cesarean section among groups residing near the power line station.

# Conclusion (cont,)

- Also, this study concluded that, EMFs generated from power line stations had no effect of on the incidence of PROM (premature rupture of membranes), maternal vital signs during labor, labor progress (uterine contractions frequency or duration and cervical dilatation), fetal heart rate during labor, oxytocin administration during labor, duration of labor (first, second, third stages and total labor duration).

# Recommendations

**Based on the findings of this study, the following are recommended:**

- **Medical and nursing relevant curricula must entail a detailed portion about the nature, sources, hazards (on health in general and on pregnancy in particular) of electromagnetic fields ;**
- **Increase dissemination of information about electromagnetic fields (nature, sources, hazards ) through mass media ;**



# Recommendations (cont,)

- **Raise awareness of all nurses in obstetrics and gynecology departments about electromagnetic fields in order to raise mother's awareness regarding its sources and health hazards to continue pregnancy safely without any complications either to the mother or the fetus;**
- **The government should put restrictions regarding to the placement of power line stations and antennas near houses.**



**Thank You for Your Attention**

