

CANCER IN THE ECUADORIAN AMAZONIA

(1985 – 1998)

1. BACKGROUND

The present document is the result of the analysis conducted on the study *Cancer in the Ecuadorian Amazonia (1985-1998)*, written by Anna-Karin Hurtig and Miguel San Sebastián. A brief summary of the main conclusions in the most relevant chapters is presented together with the corresponding remarks. Several studies made by governmental and nongovernmental agencies, universities, and by independent and non-independent professionals who are linked or not with oil companies, have also been analyzed with this purpose.

2. GENERAL CONDITIONS

The link between cancer and exposure to oil production in the Ecuadorian Amazonia, is not a recent topic; oil exploitation in the Oriente has been going on for the past 20 years. The discussion of the issue has been put forward by different entities and social groups, when faced with the existence of pathologies related to cancer in different areas of the Ecuadorian Amazonia. Nevertheless, it has not been proven that oil exploitation in the area is related to the presence of cancer. The same studies and reports made by San Sebastian, do not exclusively consider that oil exploitation and oil pollution derived from oil production activities, are the eventual cause for cancer cases, but they associate this possibility to other socio-cultural issues that co-exist with the oil activity, such as colonization, delinquency, and sexually transmitted diseases.

3. METHODOLOGY

The study *Cancer in the Ecuadorian Amazonia*, was conducted in four provinces of the Oriente: Napo, Orellana, Sucumbíos, and Pastaza, where an average population of native Indians and colonos of approximately 280,000 inhabitants exist. The oil industry

is the main productive activity in the northern Oriente, especially in Sucumbíos and Orellana. (1)

The National Tumor Register (Registro Nacional de Tumores – RNT for its Spanish abbreviation) was used as the main source of information and statistical data. The RNT gathers all information regarding new cancer cases that occur in patients that habitually live in Quito. The Amazonia has no tumor register, and patients who are believed to have cancer, are referred to Quito. Between 1985 and 1998, the RNT registered 985 cancer cases coming from the provinces of Sucumbíos, Orellana, Napo, and Pastaza. (1).

Patients were separated in two groups: exposed and non-exposed to oil activities. Those exposed, were catalogued as people who lived in a canton where oil exploitation had occurred within a minimum of 20 years. Non-exposed patients were those who lived in non-exploitation areas. There were a total of 4 exposed cantons and 13 non-exposed ones.

The statistical analysis was conducted based on calculations of the specific combined incidence rate for each specific site. Other rates calculated were rough rates, age specific, truncated and standardized rates. Relative Risks (RR) of suffering from cancer were calculated, with 95% trust intervals for men and women.

4. RELIABILITY OF THE STUDIES AND THEIR CONCLUSIONS

Due to the nature of the topic, I believe it is important to illustrate the issue with some examples of other studies which throw different results and conclusions.

- Wong O. et al conducted a meta-analysis where 350,000 oil industry workers were studied. The results obtained were: (i) no increase of gastro-intestinal cancer, (ii) no increase on lung, bladder, kidney, or brain cancer, (iii) increase of melanoma in small groups, in which the causing agent could not be determined, and (iv) prostate cancer cases which show a similar incidence to the one found among the general population. (2)

- From 1937 to 1991, Sharon Cooper conducted a meta-analysis of 10 studies from 1937 to 1991, where 92,138 oil industry workers were studied. Twenty of the most common cancer types were reviewed. These presented a 12% deficit in the mortality incidence in regards to the general population. (3)

- Lewis R.J. et al., mention in their report the results of the study conducted between 1964 and 1994, among 25,292 oil workers from a Canadian Company. Measurements on the level of hydrocarbon solvents, lubricants, crude oil, and H₂S were measured. (i) Four gall bladder cancer cases were evidenced. From these, none of them worked in the same area. (ii) A probable increase in the incidence of mesothelioma, a tumor in the respiratory tract that affects the pleura, was detected. This was associated with the presence of asbestos. (iii) A new investigation was recommended to confirm this information because exposure to asbestos was not measured. (4)

- The University of Iowa Health Care examined several studies and patients, and it concluded that risk factors for kidney cancer cases are related to gender, cigarette smoking, and exposure to asbestos, cadmium, and chemicals. (5)

5. CANCER AND OIL

On chapter 5 of the study *Cancer in the Ecuadorian Amazonia*, the authors establish a relationship between pollution caused by oil and the apparent excess in the morbidity and mortality cancer rate in the populations where oil exploitation exists.

As well as in other studies, this one shows different problems caused not only by oil as the main causative, but with what the oil industry brings: colonization, explosions, etc. Unfortunately there are very few studies on the effects of oil on exploration among production workers. (6)

Dr. Jack Semiatycki, in his comments on the article presented by Anna-Karin Hurtig and San Sebastián, in the “*International Journal of Epidemiology*”, mentions that even though some studies have suggested an association between cancer and oil, others have not been able to prove it. (7)

In this same chapter of the study analyzed, it is also been established that 27.9 cancer cases in men and 42.4 in women, are reported annually in the provinces of Sucumbios, Orellana, Napo, and Pastaza. Nevertheless, as the same authors admit, the sample sizes are smaller than those used in Quito, therefore, other risk factors should be identified. Most of the cancer cases have been diagnosed by tissue analysis (histopatology) and by hematology tests. (1)

It is also mentioned that an increase in the number of tumors has been identified, although the authors do not present oil as the exclusive causative for this increase, but it also recognizes the methodological limitations of the study, such as possible statistical errors or mistakes in the gathering and recording of information. The authors also mention the fact that the population's access to health has improved; ; therefore, the registration of the augmenting incidence of different diseases has increased. This does not necessarily mean that there is an increase in the occurrence here, but it constitutes the epidemiological reality of the areas where the studies were conducted.

In the study *Cancer in the Ecuadorian Amazonia* (1), the percentages of malignant tumors by sex, according to topographic localization (anatomic), in residents of Sucumbíos, Orellana, Napo, and Pastaza, between 1985-1998, are as follows:

Place	%Total
Cervix	17.46
Blood system	15.49
Stomach	11.88
Cervix <i>in situ</i>	8.53
Skin	7.01
Lymphatic glands	6.40
Breast	4.87
Prostate gland	2.23
Colon	2.03

Thyroid
gland 1.92
Bronchi
and lungs 1.83
Skin –
malign
melanoma 1.73

- Relative risk is augmented 1,40 on men, and 1,63 on women.
- The increase on **hematopoietic** cancer (blood) in patients under 10 years old is quite alarming; Relative Risk (RR) was of 2,63 for male and 3,60 for female patients.
- San Sebastián and his collaborators (1) find that the ALL (acute lymphoblastic leukemia) is more frequent in children, but this precise type of leukemia is not associated to oil production. In fact, 75 to 80% of the leukemia cases correspond to the ALL type, which as we said, is not associated to oil production.
- As the authors of the study have recognized, impact of exposure to pesticides was not measured. (9)

6. GYNECOLOGICAL CANCER IN THE AMAZONIA

On chapter 4 of the above-mentioned study, it is intended to find and association between gynecological cancer and women's exposure to oil pollution, in those cantons where oil exploitation exists.

Among the most important observations made by Hurtig and San Sebastián, we can mention the following:

- Cervix and breast cancer are the most common type of cancers found in underdeveloped countries. This is ironic for they are the easiest to be detected. This obeys to a lack of access to cervical cancer prevention programs and adequate treatment.

- 80% of new cervix cancer cases in the world will come from underdeveloped countries.
- The fact that Quito occupies the ninth place in the list of the 50 countries with the highest cancer rates is quite alarming.
- According to the RNT, between 1985 and 1988, 60.3% of cancer cases were diagnosed in women, and 56.9% among those cases, were gynecological.

The percentage of gynecological cancer cases standardized by age is of 21.58% for invasive cervix cancer, 8.26% for in-situ cervix cancer, and 5.08% for breast cancer. (See Chart 4.1 in *Cancer in the Ecuadorian Amazonia*, p. 27).

There exists an association between socio-economic condition and cervix cancer. Women with Primary education or less had almost twice the incidence in regards to women who had Secondary or higher education. Illiterate women had almost a six times higher incidence than university women. (1)

7. DISCUSSION

- The evidence presented in the study *Cancer in the Ecuadorian Amazonia* have been limited. The studies do not have enough weight because the samples are inadequate.
- The results are interesting, but at the same time, there are other studies that contradict them and others that reaffirm them; therefore, there is a lack of consistency.
- The association between benzene and certain types of cancer is clear but not so for oil.
- Over half of the cancer cases in women of the Ecuadorian Amazonia are gynecological and breast cancers. The finding can be confirmed with other studies.
- It is troublesome, but expected to see that the incidence of cervix cancer is greater in Amazonia in regards to Quito. This could hypothesize that there is

a greater incidence of sexually transmitted diseases, which is confirmed by the YANA CURI report. (8)

- According to the results of cervix cancer investigations, there is a faulty prevention and diagnoses in the Amazonia, as well as a lack of prevention and education programs.
- Women in Quito, who have a higher degree of education, had a lesser risk of suffering from cervix cancer than illiterate women or those with a lower degree of education.
- Examination of cervical cytology is the golden rule for cervix cancer diagnoses, but in areas like the Oriente, it is very difficult to achieve, both because of logistics as well as due to cultural beliefs. Accessible means of diagnosis for the people, should be developed in underdeveloped countries, specially if these are the ones that show a greater cancer incidence.
- The same situation pertains to mammography, because examination cost is higher in these countries. Self-breast checks and those conducted by health workers should be encouraged.

8. CONCLUSIONS

Ethnicity is not taken into account by the RNT and this is problematic, particularly in a multiracial country like Ecuador. This is problematic because different studies show a greater incidence of certain types of cancer, depending on the patient's race.

This is the first study that has been conducted, therefore it throws out many hypotheses and a long way is yet to be traveled. There is no clear evidence that proves oil and its derivatives are a direct cause of risk for cancer. Until now, all the studies that have been conducted, only generate hypotheses without presenting clear statistical and non-slanted data.

9. RECOMMENDATIONS

A future follow-up cancer study conducted among the people in the Amazonia exposed to oil exploitation should include the following:

- The design should have a cohort design. The disadvantage is that the study is long but the results are trustworthy and it limits the number of confusing variables. The relative risk calculation is more trustworthy and precise than that of a control case.
- Degrees of exposure should be determined.
- The sample should be bigger. The greater the sample, the longer it will take to complete the study.
- Two groups should be taken into consideration for the follow up: the first one of exposed people, and the second of non-exposed people.
- Define exposure: how? length of time? Doses and type of exposure? Disadvantages of a cohort design: lengthy and costly study.
- Sound measure of the cases, in order to avoid overestimates and underestimates.
- To look for captive populations, such as school children. With this, moving populations could be avoided and the follow-up process would become easier.
- Do not use the records of the National Tumor Register, as the only source, because it limits the study to Quito. This obeys to the limited access to these records, especially in distant populations.
- A double-checking should be conducted with data from other provinces.
- A base line should be set before proceeding to the follow-up. For this, it is important to use a captive population as a sample.
- Limitations of the case-control design: it increases biases and confusing variables. The advantage of the case-control design is that it costs less.

The following recommendations should be implemented as soon as possible:

- To establish a security system

- To implement a regional control program adapted to regional characteristics due to an augmented incidence of cervix cancer.
- More studies on the association between cancer and oil should be conducted.

BIBLIOGRAPHY

1. Cooper SP et al. *Journal of Environ. Pathology, Toxicology and Oncology*. 16, (1): 1-14. 1997
2. Hurtig and San Sebastián. Incidence of childhood leukemia and oil exploitation in the Amazon Basin of Ecuador. *Int J Occup Environ Health*. 10: 245-250. 2004
3. Instituto de Epidemiología y Salud Comunitaria “Manuel Aminarriz”. Informe Yana Curi. Coca, 2000.
4. Lewis RJ et al. Mortality and Cancer Morbidity in a Cohort Study of Canadian Petroleum Workers. *Occupational and Environmental Medicine*. 2003; 60, 918-928.
5. San Sebastián et al. *Cáncer en la Amazonía del Ecuador. 1985-1999*.
6. Semiatycki Jack *International Journal of Epidemiology*, pg. 1029, Great Britain 2002.
7. Stead Craig. CDC Conference on the Health Impact of Chemical Exposures During the Gulf War.
8. University of Iowa Health Care Web page.
9. Wong O, Raabe GK. *Regul. Toxicol. Pharmacol*. 2000, Aug 32 (1) 78-98.