

## ASSESSMENT OF THE IMPACT OF BACKGROUND GAMMA RADIATION ON REPRODUCTIVE DEFECTS IN TWO MAJOR IGBO TOWNS OF NIGERIA.

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### ABSTRACT

Late biological effects of ionizing radiation on humans result in induction of cancers and various forms of genetic defects.

A preliminary survey of hospital based data in Enugu and Owerri in the South Eastern States of Nigeria were carried out to ascertain possible relationship between our observed data on background radiation levels and reproductive abnormalities in these areas.

The incidence of reproductive defects seems to correlate more with life style and socio-economic status than with background radiation dose rates.

### ABSTRAIT

Les effets biologiques en retard de la radiation ionisante sur des humains ont comme conséquence l'induction des cancers et les diverses formes de défauts génétiques.

Un aperçu préliminaire des données basées par hôpital dans Enugu et Owerri dans les états orientaux Du sud du Nigéria ont été effectués pour établir le rapport possible entre nos données observées aux niveaux de rayonnement de fond et anomalies reproductrices dans ces secteurs.

L'incidence des défauts reproducteurs semblent corrélér plus avec le style de vie et le statut socio-économique qu'avec des taux de dose de rayonnement de fond.

### INTRODUCTION

There are several data available in literature on attempts made to assess health risks associated with natural background gamma radiation on exposed populations.

In Nigeria for-example, some assessments have recently been made. Thus data are available on assessment of radiological impact of levels of natural radioactivity in rock samples<sup>1</sup> and from terrestrial gamma radiation doses<sup>2</sup>. Elsewhere there are reports of radiological effects of natural radioactivity emanating from phosphate deposits in Egypt<sup>3</sup>.

The role of background radiation on the production of chromosomal translocations<sup>4</sup> and assessment of its effects on haematologic components has been established in USA<sup>5</sup>.

Most of these assessments of the effects of low background radiation levels do not indicate major radiological consequences.

However, surveys done in areas of high natural background radiations in Iran<sup>6</sup>, Russia<sup>7</sup> and Kerala,<sup>8</sup> show that such levels rather altered more the immune systems rather than induce radiation disorders. This, they suggested would lead to higher incidences of immune related diseases. It is interesting to note from a recent study in USA<sup>9</sup> that moderate dose rates of ionizing radiation rather increase longevity. This opinion contrasts with the long standing evidence that such levels of radiation cause life-shortening, perhaps by increasing

senescence<sup>10</sup>.

The objective of our study was to contribute to these ongoing contradictory findings, the results of our risk assessment of two Igbo towns with known natural background radiation levels.

#### METHODS

For survey of reproductive defects including twinning, two population centers were chosen Enugu and Owerri. These two towns are inhabited by Igbo Africans and this homogeneity reduces genetic variations. Enugu is hilly and has few industries such as a vehicle assembly plant, asbestos factory and coal mines. Owerri is mainly residential, not hilly and does not possess mines.

Retrospective concurrent population surveys of two hospitals, University of Nigeria Teaching hospital, Enugu and the General Hospital at Owerri including Okpara's Nursing Home, were made. The duration of study was over a five year period. Data on the incidence of reproductive malformations were obtained from maternity wards, infant intensive care/new born units. These included multiple, still births, prematurity congenital malformations, spontaneous abortions and total admissions within the period of study. The places of domicile and professions of the parents were collected. These information were used in classifying them into urban, rural urban and typically rural dwellers.

#### RESULTS

Table 1 A&B summarizes the distribution of reproductive defects in the two boroughs. This is discussed alongside our earlier data on background gamma radiation measurements in these towns.

#### DISCUSSION

The results of Obioha, et al<sup>11</sup>, show no startling differences between natural

radiation dose equivalents measured in Enugu (approx.1026 Sv/year) and Owerri (1009 Sv/yr) The data from Enugu excludes areas around mine locations which have higher background radiation levels (1,755 Sv/yr). Similarly, there were no significant differences between average radioactivity expressed in bacquerels in sand and cassava from locations in these areas. At the same time, surveys of reproductive defects seen in two major hospitals tend to rule out any attributable role from background gamma radiation. These findings are similar to data from some parts of the Country<sup>1,2</sup> and re-emphasize the need for national programs to address full coverage of the entire Country both for indoor and outdoor exposures to human populations. It is becoming increasingly important for nations to evolve national averages for their environments as these are now used as benchmarks for introduction of new technologies and lifestyles<sup>12</sup> Although our data excludes areas around mine locations, this study aimed to emphasize comprehensive radio-ecological studies of human populations, the rest of fauna and flora in these high background radiation areas. To further assess other heritable anomalies in the populations<sup>8</sup>

The results of our work did of course show differences based on socio-economic parameters. It is arguable that there are no valid demographic indications for demarcation of our population into various socio-economic classes. However, it is obvious that how a person lives is determined largely by where he lives. Thus it is seen in our results that for both Owerri and Enugu, the frequency of reproductive defects was almost doubled in the low to medium income groups. We recognize also in this study that hospital based data have an in-built bias. In this instance, low income mothers are usually multigravidae and therefore more prone to reproductive defects. Indeed there is a large population of low income mothers

who do not frequent hospital except when reproductive difficulties ensue. Since our findings in this preliminary report do not show startling differences due to background gamma radiation levels, other factors such as socio-economic, dietary and other environmental factors may be contributing to this pattern. Further works on matching background radiation levels with epidemiological

surveys of radiation related diseases are recommended.

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**TABLE 1A.**  
**Reproductive Defects in Enugu and Owerri.**  
**HIGH INCOME DWELLERS**

Towns	Spontaneous abortions	Multiple Births	Still Births	Prematurity	Cong. Malform	Total birth defects	Total admissions	Frequency
Enugu	No data	120	310	50	40	520	12408	4.19
Owerri	72	31	20	10	--	133	20,371	0.65

**TABLE 1 B**  
**LOW INCOME DWELLERS**

Towns	Spontaneous abortions	Multiple Births	Still Births	Prematurity	Cong. Malform	Total birth defects	Total admissions	Frequency
Enugu	No data	200	542	151	160	1051	12,408	8.46
Owerri	427	388	407	56	21	1299	20,371	6.38

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