

# POSSIBLE IMPLICATIONS OF PARENTAL OCCUPATION IN CONGENITAL MALFORMATIONS GENESIS

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**Keywords:** congenital malformations, parental occupations, NACE codes

**Abstract:** The study represents an analysis of parental occupation in a group of 1460 children born with various birth defects in the NW and SW development regions in Romania. We have classified both parents into occupational groups, according to the National Classification of Economic Activities (NCEA) code, and each group share was compared with the corresponding national employment structure. We have found a statistically significant excess of representation for the mothers who had children with birth defects employed in manufacturing, hotels and restaurants, compared to women of childbearing age engaged in those branches nationwide and also an excess of representation of fathers employed in manufacturing, mining, construction, hotels and restaurants, health and social care. The manufacturing sector appears to be a good objective for a future detailed research.

**Cuvinte cheie:** malformații congenitale, ocupații parentale, coduri CAEN

**Rezumat:** Studiul reprezintă o analiză a ocupației părinților la un lot de 1460 de copii cu diverse malformații congenitale, de pe raza regiunilor de dezvoltare NV și SV din România. S-a înregistrat apartenența ambilor părinți la grupele ocupaționale, constituite conform codului CAEN, iar ponderea s-a comparat cu cea corespunzătoare din structura populației ocupate la nivel național. S-a constatat un exces semnificativ statistic de reprezentare a mamelor care au născut copii cu malformații congenitale angajate în industria prelucrătoare, hoteluri și restaurante, comparativ cu femeile de vârstă fertilă angajate în respectivele ramuri la nivel național. Un exces de reprezentare al taților s-a înregistrat în industria prelucrătoare, în cea extractivă, construcții, hoteluri și restaurante, sănătate și asistență socială. Industria prelucrătoare apare ca un obiectiv destinat unor cercetări viitoare detaliate.

## INTRODUCTION

In a previous paper, we have presented general issues relating to the prevalence of the various types of congenital malformations in two development regions of Romania (NW and SW), the observed data suggesting a relationship with the employment of the labour force and the social economic development of the region.

Exposure to numerous risk factors (physical, chemical, biological) which are present in the working environment may be involved in the emergence of malformations.(1,2,3,4) These factors may act on both parents before conceiving, by determining mutagenic effects, as well as only on the woman, during pregnancy. Starting from these premises, we have proposed an analysis of a possible relationship between the congenital malformations and the occupation of parents, the research aiming at encouraging the current campaign on protection of the sensitive risk occupational groups. The observations collected will form the basis for formulating protection policies against the reproductive risk for some occupations.(3)

## PURPOSE OF THE STUDY

The study represents an analysis of parents' occupation on a batch of 1460 children with different congenital malformations from the NW and SW regions of Romania.

## MATERIAL AND METHOD

This study is based on the analysis of a number of 1460 cases of birth defects recorded in the Paediatric Surgery and Paediatrics Departments of Cluj-Napoca and Craiova, where they have diagnosed and treated cases of congenital malformations in the two development regions of Romania: NW and SW.

From the data collected, we recorded for this study the type of malformations and the parental occupation of the parents.

For an easier data processing and in order to avoid multiple subdivisions in small groups based on occupation, which is difficult to process and compare, the parents' occupations were summarized in professional groups (G) according to the national economic activities classification (NCEA code).

Both parents were assigned each to an occupational group and the percentage of "loading" for the main professional groups was calculated. The proportion of each occupational group that included mothers were compared by chi square test, with the existing structure of employment of the labour force by economic sector (reference control group), retaining for the calculation the women aged 15 to 44 years. The data on this structure had as source the "statistical research" on labour in households (AMIGO-2006).

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## CLINICAL ASPECTS

### RESULTS

The distribution of the congenital malformations according to the occupational groups of the mothers is shown in Table 1. One can notice a predominance of the groups G2, G1 and G7 followed by the other professional groups appearing in a much smaller proportion. Comparing the share of the professional groups in our batch with those for the general occupied population, the existence of some low and of some increased risks for congenital malformations for every professional group was assessed. For the first (low risk), the ratio between the observed professions and their calculated frequency from the structure of employment is less than one, while an increased risk involves a ratio higher than one (see Table 1). We did not process the groups G7 and G8, as those groups included diverse occupations, heterogeneous and confusing. For all occupational groups, the differences in frequency of representation (study group / control group) are statistically highly significant  $p < 0.001$ . As shown in Table 1, the risk for the mothers engaged in manufacturing, and for those working in hotels and restaurants is higher than in the case of other groups.

The assignment of fathers into occupational groups is shown in Table 2. There is a statistically significant detachment of the representation of fathers in occupational groups such as manufacturing, hotels, restaurants, construction, health and social care. Other activities, social and personal services represented in proportion of 0.38%, were not processed because very different occupations include heterogeneous in terms of risk factors.

### DISCUSSION

Parental exposures to risk factors, especially mother's exposure during pregnancy can cause with a high probability birth defects among offspring. In the second half of the

twentieth century, the proportion of working women has increased rapidly in the employment structure and hence exposure to risk factors.(2)

Our study, as a first approach in the local literature, sets the main focus on special occupational groups to be pursued in future research, the first area concerning the manufacturing industry, this includes: manufacture of furniture, clothing and footwear, chemical syntheses such as pesticides, cosmetics, pharmaceuticals, clothing, leather and so. In these sectors, the organic solvents have a significant role, being recognized as involved in human reproduction toxicology.(1,2,6,7) Employees of the hotel - restaurants seem to be influenced negatively; for women, prolonged standing, and the lack of exercise, long hours, represent possible risk factors, while for men, the excessive alcohol consumption often can influence the quality of gametogenesis. Healthcare personnel may be at risk of infections contamination, during pregnancy as an important risk factor. In addition, a number of people in laboratories, pathology services, operating rooms are exposed to a variety of chemical agents: aldehydes, solvents, etc. anaesthetic gases.(1) Even if these investigations were limited to the occupational group, they point out the importance to continue to improve monitoring programmes that will contribute to risk mitigation. Medical and social consequences and primarily the high costs related to congenital anomalies generating disabilities fully justify the approach in this area.

### CONCLUSIONS

Investigations regarding the relationship between birth defects and parental occupation have brought in the foreground the reproductive risks involved in manufacturing industry, hotels restaurants and the activities in medical fields. For further studies, our research needs to focus, firstly on the manufacturing industry.

**Table no. 1. Frequency ratio of the studied group versus the control group for the occupational groups of mothers**

National economic activities	Employed population (women) aged 15-44 years				
	At national level		Study on 1.460 cases		Frequency ratio - studied group vs. the control group
	Number	%	Number	%	
Total	2.622.959	100	1.460	100	1
G1 – agriculture, forestry	637.000	24,8	317	21,7	0,87
G2 – manufacturing	644.371	24,5	605	44,4	1,8 (p<0,001)
G3 – trade	437.873	16,6	87	5,9	0,35
G4 – hotels, restaurants	86.399	3,2	69	4,7	1,46 (p<0,001)
G5 – education	254.280	9,6	48	3,2	0,33
G6 – Health and social care	181.169	6,9	55	3,7	0,53

**Table no. 2. Frequency ratio of the studied group versus the control group for the occupational groups of fathers.**

National economic activities	Employed population (men)				
	At national level		Study on 1.460 cases		Frequency ratio - studied group versus the control group
	Number	%	Number	%	
Total	5.075.585	100	1.460	100	1
G1 – agriculture, forestry	1.508.040	29,7	145	9,9	0,33
G2 – mining and quarrying	101.400	1,9	61	4,1	2,15 (p<0,001)
G3 – manufacturing	1.028.000	20,2	532	36,4	1,8 (p<0,001)
G4 – constructions	501.300	9,8	162	11,2	1,14 (p<0,001)
G5 – trade	482.540	9,4	88	6,0	0,63
G6 – hotels, restaurants	52.624	1,0	68	4,6	4,6 (p<0,001)
G7 – transport	376.872	7,4	83	5,6	0,75
G8 – education	107.010	2,1	39	2,1	1,03
Health and social care	48.891	0,9	35	2,3	2,55 (p<0,001)

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