




## Incidence of Egyptian Live Births of Cleft Lip and/or Palate in Cairo, Luxor, Aswan and New Valley Governorates: A Survey Study in 237,783 Children


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### Abstract

**Objective:** To evaluate the prevalence, cleft types distribution and etiological risk factors among newly born babies with cleft lip and/or palate (CL±P) in four governorate of the Arab Republic of Egypt, beginning the 1st of January 2013 till the 31st of December 2013. **Material and Methods:** Total 237,783 newly born babies from Cairo (162174), Aswan (42880), Luxor (32729), and New Valley (877) governorate in the Arab Republic of Egypt were included in this study. Incidence of CL±P babies per 1000 births was calculated in each district for the four studied governorates. Percentage distribution of cleft types within each governorate. Chi-square test was used for determining significance of difference of incidence and percentages within and between the governorates. **Results:** The mean prevalence value of CL±P in the four Egyptian studied governorates was 0.40/1000. The highest percentage of cleft type was cleft lip and palate followed by cleft lip and isolated cleft palate. The highest etiological risk factor was maternal passive smoking in the four studied governorates followed by consanguineous marriage and medicine intake during pregnancy. **Conclusion:** These data provided a picture of the prevalence of CL±P in four different governorate of Egypt and also provided a useful reference for cleft types distribution and etiological risk factors of CL±P data in Egypt and internationally.

**Keywords:** Mouth Abnormalities; Cleft Lip; Cleft Palate; Epidemiologic Measurements.

## Introduction

Oro-facial anomalies particularly cleft lip and/or palate (CL±P) are a major public health problem in newly born infants affecting one in every 500 to 1000 births worldwide with ethnic and geographic variation [1]. The majority of CL±P are caused by the multifactorial inheritance of a threshold character, whereby several genes act in concert with environmental agents [2,3]. The relative contributions of these genetic and environmental influences have been repeatedly examined in a number of investigations [4].

Nevertheless, the exploration of demographic variables in different populations throughout the world has had the greatest impact in advancing our understanding of oro-facial clefts. A child with this anomaly not only suffers from poor dental development but also other problems like breast feeding due to improper oral seal, swallowing and nasal regurgitation, hearing problem due to abnormalities in the palatal musculature, and speech problem due to nasal escape and articulation complications. Children with these disorders need multidisciplinary care from birth to adulthood and have higher morbidity and mortality throughout life than do unaffected individuals [5].

Incidence refers to the total number of existing clefts of all or particular ages in a defined population at a given point in time or during a specified period. Incidence rates are cross-sectional in nature therefore; gather all existing birth cohorts in a defined population during a specified time.

Variations in Incidence rates for CL±P may be attributable to several factors, one of which is its reliance on inaccurate sources such as birth certificates, hospital records and clinic records with failure to correct for their under ascertainment bias<sup>6</sup>. Birth Incidence and incidence of CL±P show ethnic variation. European and North American Caucasian populations have been extensively reported with respect to the birth Incidence of cleft lip and palate, yielding consistent estimates of approximately 1.0 per 1000 births. African-American populations yielded consistently lower Incidence rates, approximately 0.5 per 1000 births [6].

The importance of maintaining a register of infants born with CL±P in any clearly region is now well recognized. A register may then be used to plan and develop the provision of cleft services and allow comparison between regions. A long-term register also facilitates monitoring of the epidemiology and demography of CL±P, as treatment and research into the etiology develops.

Egypt is considered the most populous country in the Middle East and the third-most populous country on the African continent with a population of more than 82.5 million people. The literature on the descriptive epidemiology of orofacial clefts does not provide the information about the incidence of CL±P in Egypt. Hence, the objective of this study was to estimate and compare the incidence of cleft defects, cleft types distribution and etiological risk factors among the four governorates namely Cairo, Luxor, Aswan and New Valley governorates.

## Material and Methods

### Study Design

This study was conducted as a part of a national research project which was done in collaboration between the Ministry of Health and Orthodontic Department in the Faculty of Oral and Dental Medicine, Cairo University, Egypt.

## Data Collection

The data was included all 237,783 newly born babies with CL±P in Cairo (162174), Aswan (42880), Luxor (32729), and New Valley (877) governorate in the Arab Republic of Egypt, beginning the 1st of January 2013 till the 31st of December 2013 (Figure 1). In each governorate the data was collected from medical units, primary health care facilities and main governmental hospitals of the Ministry of Health, University hospitals and main health offices. Seven master degree candidates at the Orthodontic Department in the faculty of Oral and Dental Medicine, Cairo University were partners in data collection from every governorates which were randomly and equally divided between them.

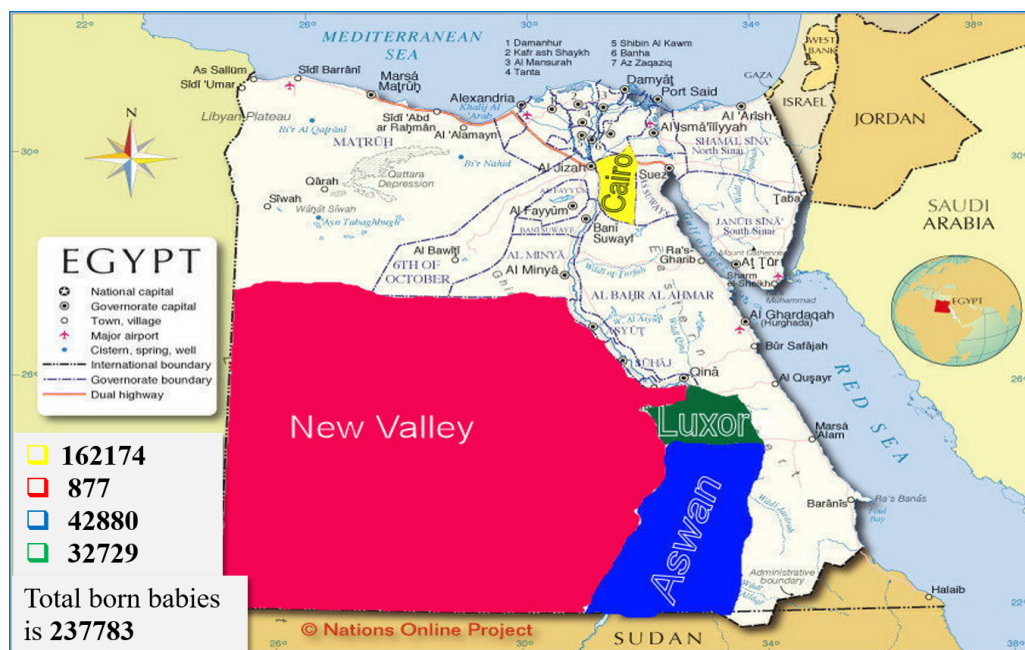


Figure 1. Map of Egypt, showing the studied governorates with the number of newly born babies: Cairo, Luxor, Aswan, and New Valley.

The following inclusion criteria were adopted: newly born infants with cleft lip and / or palate in the year of 2013 and the babies born to Egyptian parents. As exclusion criteria were established: babies born to non-Egyptian parents; stillbirths; abortuses; atypical oro-facial clefts (transverse or oblique oro-facial clefts).

The Ministry of Health endorsed the maternity staff members including the doctors and the nursing staff who had been participated in the program from every governorate before the initiation of the project. A one day course was conducted at the orthodontic department, Faculty of oral and dental medicine, Cairo University for the newly endorsed member to train how to detect, diagnose

and classify the newly born cleft babies. The participants were also trained how to fill in the diagnostic sheet and the diagrammatic sheet representing the classification of CL±P used in the study. At the end of that day, a small test was given to evaluate the ability of the staff to diagnose the cleft cases. Handouts and CDs were distributed for each participant to be as a resource or reference for any missing information.

Diagnostic files containing ten diagnostic sheets and the diagrammatic representation of the classification of CL±P were provided for each medical unit, health care facility and main governmental hospital, each sheet having a sequential serial number for registering personal, familial, medical history and any predisposing factors for each newly born cleft baby.

The diagnostic sheet included information on the cleft type, affected side, sex and consumption of any medication or drugs during the first trimester and consanguinity of the parents were recorded. The diagrammatic sheet represented description of the type and the affected side of the cleft lip, cleft palate, or both were described according to modified Shapira et al. Classification [7].

## Data Analysis

The incidence of CL±P babies per 1000 births was calculated in each district for the four studied governorates. Percentage distribution of cleft types within each governorate. Chi-square test was used for determining significance of difference of incidence and percentages within and between the governorates. These analyses were carried out using the statistical package IBM SPSS Statistics version 20 (SPSS Inc., Chicago, IL, USA). The significance level was set at  $p < 0.05$ .

## Results

Among 237,783 newborn babies, a total incidence of 0.40/1000 of cleft defects was found in the four governorates. The highest incidence of cleft defects was found in Luxor governorate of 0.50/1000 while, the incidence of clefts in Cairo and Aswan was 0.47 and 0.12/1000 respectively. There was statistically significant difference in the incidence of cleft defects between the three governorates. Table 1 showing the results of the incidence of cleft cases in all four studied governorates.

**Table 1. Incidence of cleft cases in all four studied governorates.**

Governorate	Count of Births	Count of Cleft Cases	Incidence		p-value
			n/1000	1cont	
Cairo	162174	76*	0.47/1000	2133.9	0.005*
Luxor	32729	15	0.5/1000	2181.9	
Aswan	42880	5*	0.12/1000	8576.0	
New Valley	877	0	0/1000	0	
Total	237,783	96	0.4/1000	2476.9	

\*Statistically Significant.

Twenty-three (25.6%) cleft lip cases were totally recorded in the four studied governorates, 10 (69.9%) in Cairo and 7 (30.4%) in Luxor (Table 2). Three (3.3%) cleft lip and alveolus cases were recorded in the four studied governorates and 3 (100%) in Cairo. Forty-four (48.9%) cleft lip and palate cases were recorded in the four studied governorates, 36 (81.8%) in Cairo, 5 (11.4%) in Luxor and 3 (6.8%) in Aswan. Twenty (22.2%) isolated cleft palate cases were recorded in the four studied governorates, 18 (90%) in Cairo and 2 (10%) in Aswan. Statistically significant difference was found between the four governorates regarding the percentages of cleft lip at Luxor governorate ( $p < 0.05$ ).

**Table 2. Significance of variations in percentage of each type of cleft defects between the four studied governorates.**

Cleft Type		Governorates				Total Percent within Cleft	p-value
		Cairo	Luxor	Aswan	New Valley		
Lip	N	16	7*	0	0	23	0.03
	%	69.9	30.4	0.0	0.0	25.6	
Lip and Alveolus	N	3	0	0	0	3	0.6
	%	100.0	0.0	0.0	0.0	3.3	
Lip and Palate	N	36	5	3	0	44	0.52
	%	81.8	11.4	6.8	0.0	48.9	
Isolated Cleft Palate	N	18	0	2	0	20	0.07
	%	90.0	0.0	10.0	0.0	22.2	
Total	N	73	12	5	0	90	
	%	81.1	13.3	5.6	0.0	100.0	

#### Etiological Risk Factor Variations Between the Four Governorates

Consanguineous marriage was recorded in 16 (61.5%) babies in Cairo, 8 (30.8%) babies in Luxor and 2 (7.7%) babies in Aswan governorates however; none was recorded in New Valley. While, family history of cleft was recorded with 12 (100%) babies in Luxor governorate, none was recorded in other governorates. Medicine intake during pregnancy was recorded with 24 (100%) in Cairo governorate, none was recorded in other governorates. On other hand, maternal passive smoking were recorded with 60 (80%) babies in Cairo governorate, 12 (16%) babies in Luxor, 3 (4%) babies in Aswan and none in New Valley. Disease during pregnancy was recorded with 15 (71.4%) babies in Cairo, and 6 (28.6%) babies in Luxor governorates. Diseased father was recorded with 4 (66.7%) in Cairo, and 2 (33.3%) in Luxor governorates. Alcoholic mother was recorded 1 (100%) in Cairo governorate. Table 3 representing the etiologic risk factor within four studied governorates.

**Table 3. Distribution of etiological risk factors between the four studied governorates.**

Risk Factor	Governorate							
	Cairo		Luxor		Aswan		New Valley	
	N	%	N	%	N	%	N	%
Consanguineous Marriage	16	61.5	8	30.8	2	7.7	0	0.0
Positive Family History	0	0.0	12	100.0	0	0.0	0	0.0
Medicine Intake During Pregnancy	24	100	0	0.0	0	0.0	0	0.0
Maternal Passive Smoking	60	80.0	12	16.0	3	4.0	0	0.0
Diseases During Pregnancy	15	71.4	6	28.6	0	0.0	0	0.0
Diseased Father	4	66.7	2	33.3	0	0.0	0	0.0
Alcoholic Mother	1	100.0	0	0.0	0	0.0	0	0.0



## Discussion

Oro-facial clefts are one of the most common congenital birth defects; the etiology is multifactorial [8]. It may have a negative impact not only on the child but also on the parent. The child suffers from poor dento-facial esthetics and low self-esteem. Children with these disorders suffer higher morbidity and mortality throughout life than do unaffected individuals and need multidisciplinary care from birth to adulthood [9]. Both congenital and postnatal factors are responsible for this abnormal phenomenon [10-15].

In an exceptional collaboration of the Egyptian Ministry of health with Orthodontic Department - Cairo University, a prospective population based study undertaken at the end of 2012 to register newborn infants with CL±P with in all Egyptian governorates during the period from 1st of January to 31st of December 2013, Except North and South Sinai for national security reasons. This study was aimed to determine the incidence of CL±P in Cairo, Luxor, Aswan, and New Valley Governorates.

This study declared that the mean incidence value for the four studied governorates was 0.4 per 1000. The highest incidence was found in Luxor Governorate (0.5 per 1000). On the other hand, new births with clefts were in Cairo (0.47 per 1000), Aswan (0.12 per 1000) and New Valley (0.0 per 1000). Significant difference was recorded between the four Egyptian governorates ( $p < 0.05$ ). Almoski district scored the highest incidence (14.56 per 1000) in Cairo governorate, followed by Luxor Center district (2.7 per 1000) in Luxor, and Edfo shark (0.22 per 1000) in Aswan governorate. This was not widely divergent from incidence recorded in Middle East [16,17].

Birth incidence and incidence of oro-facial clefting showed ethnic variations. Oral cleft incidence has been reported as 0.37 per 1000 in Nigeria [18], 1.39 per 1000 in Jordan [19], 0.3 per 1000 in Saudi Arabia [20], 0.34 per 1000 in California, USA [21], 1.53 per 1000 in Scotland [22], 2 per 1000 in Sweden [23], 1.81 per 1000 in Korea [24], 1.44 per 1000 in Japan [25] and 1.2 per 1000 Shanghai, China [26].

Regarding gender distribution, in this study the male dominance in CL±P was common in Cairo and Luxor Governorates, while female dominance was a common in Aswan governorate. This came in agreement with several studies [16,19,20,27,28].

Cleft lip and palate was observed in highest incident in Cairo (0.22/1000), and Aswan (0.07/1000) governorates, while the cleft lip was most incident in Luxor governorate however, these findings were statistically insignificant in all governorates. In some previous studies also reported that cleft lip and palate was most incident followed by Cleft lip and alveolus was the least incident type, which is similar to our findings [9,19,29,30].

Regarding unilateral or bilateral cleft distribution, this study revealed that unilateral clefts were dominant in all studied governorates. There was statistically significant predilection of unilateral clefting and also consistent with some other previous studies [31-34].

Concerning cleft sides, higher birth incidence of left sided clefts was found in Cairo and Luxor governorates while the right sided was dominant in Aswan governorate. Similar findings also

reported in Tanzania population [34], Madagascar population [35] and Malaysian population [36-38].

In the present study, maternal passive smoking was the highest risk factor, which was surprisingly not related to the mother. Followed by, consanguinity and medicine intake during pregnancy were also chief risk factors. Maternal passive smoking during pregnancy was associated with an increased risk for CL±P in offspring [39]. This may suggest that air pollution resulting from cigarette smoking may play a role as an etiological factor in facial cleft occurrence. Clefting in humans was most likely due to a combination of genetic and environmental factors [40,41]. Genetic disorders could be classified into chromosomal disorders, single-gene disorders, multifactorial disorders, and mitochondrial disorders. CL±P were proved to be separate etiological entities, and for both, multifactorial inheritance had been proposed [42,43]. If more than one family member was affected, the risk of recurrence would increase.

## Conclusion

The mean incidence value of CL±P in the four Egyptian studied governorates was 0.40/1000. However, this incidence value varied significantly between 0.5/1000 in Luxor, 0.47/1000 in Cairo, in Aswan 0.12/1000, and 0/1000 in New Valley.

The highest percentage of cleft type was cleft lip and palate followed by cleft lip and isolated cleft palate. Cleft lip and alveolus has the least percentage. Cleft type varied insignificantly between the studied governorates. The highest etiological risk factor was maternal passive smoking in the four studied governorates followed by consanguineous marriage and medicine intake during pregnancy.

**Authors' Contributions:** HJRA, FAAE, MYF, FHF, SH and MKA contributed to conception and data design, data acquisition, analysis, and interpretation, drafted and critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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**Conflict of Interest:** The authors declare no conflicts of interest.

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