

# **Presented by Paola Manduca**

**Professor of Genetics, DISTAV University of Genoa, Italy**

**Results published in scientific Journals with referees 2009-2014**

**on behalf of the newweapons research groups**

**Contemporary weapons, contamination by toxic metals / teratogenic / carcinogenic and some of their long-term effects on the reproductive health of the population.**

# Bringing proofs

We here give proofs of correlation to exposure to weapons used in attacks on Gaza with long term damages on reproductive health.

The effects studied are those on presentation of major structural birth defects

## Context of the attacks: lack of possibility to displace for the population

Attacks to Gaza were waged in a crowded area, on a population of about 1.600.000, of which more than half under 18 years of age, under siege by ground, air and sea, unable to escape, displace or find shelter.

*The whole population was condemned to be exposed to the attacks, with full knowledge of the attackers, as these were the same that controlled the ways out by sea and ground.*

## The weapons components whose role has been investigated are the metals because:

- Metals are components of penetration bombs used by the 90s and were alleged components of a new generation of weapons "not fragmentation and metal augmented" put in place in the new century in Iraq, Lebanon and Gaza.
- Metals are stable and stable environment in the body when taken up by the living.
- Metals are capable of inducing transmissible diseases and disorders in individuals who are contaminated.



## **Background and scientific context of the studies**

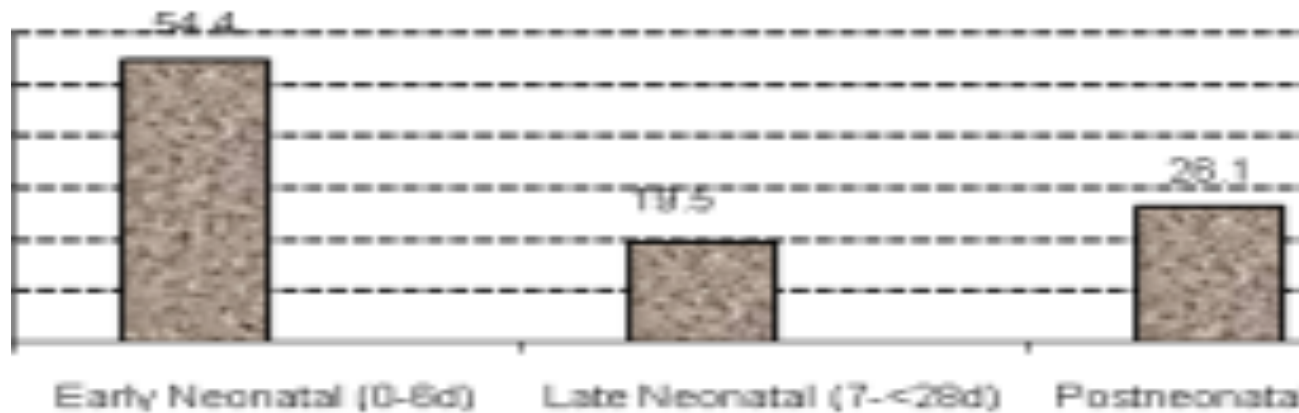
**Our studies are in line with numerous studies about the birth defects and cancer-inducing effects of metal contaminants in industrial and environmental sites, and are largely in agreement with the accumulating proofs of the effect of metals as causative agents for reproductive damages and as environmental effectors on public health.**

**These studies also participate to the understanding of the involvement of epigenetic mechanisms in cancer and birth defects causation, also in absence of genetic mutations.**

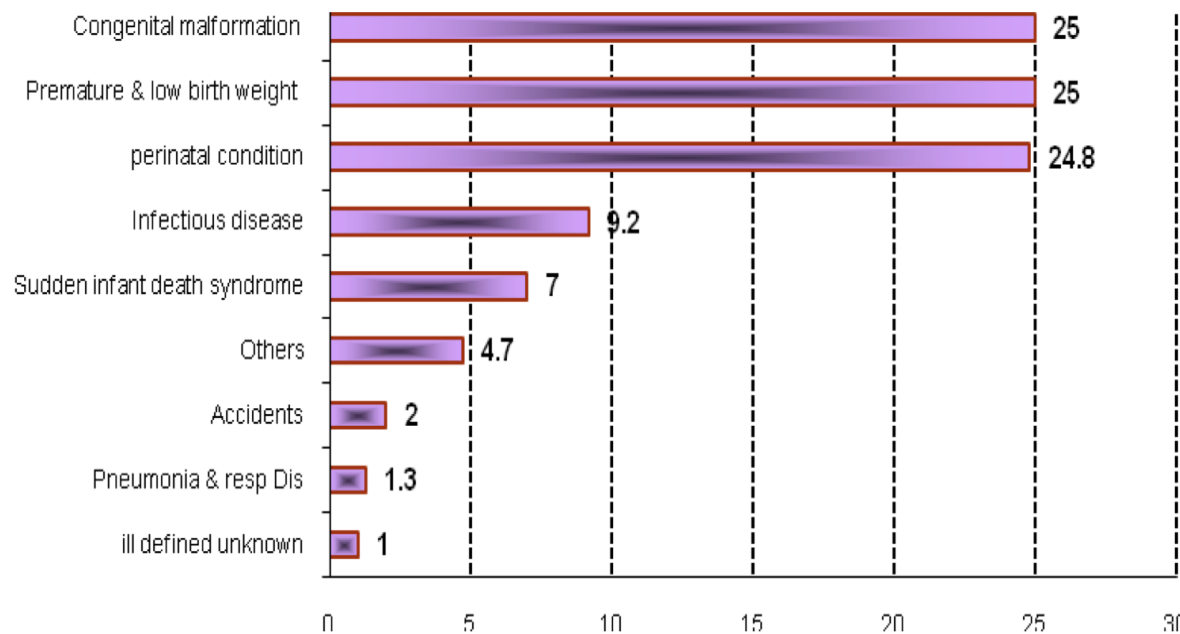
# The people



Prospective study Al Shifa Hospital, Gaza 2011



**Gaza Strip, Mortality/1.000 in 2012**



**A quarter of perinatal mortality is due to birth defects (approximately 800 children per year).**  
*N.Baraquni*

**About 1.800 children are born each year with birth defects of which slightly more than half survive (1000).**  
*Naim et al. 2012.*

Figure (41) Leading causes of death among infants in GS, 2012  
(Proportional of total infant deaths)

## Our data show

### Directly

Presence in wounds from weapons without fragments used since 2006 of metals teratogenic / carcinogenic

### Directly

Intake by children of teratogenic / carcinogenic metals, measured 10 months after the attacks of "Cast Lead"

### Temporal correlation

between the use of weapons and the prevalence of birth defects, detected as an increase in birth defects since 2005

### Correlation of facts

between the exposure, documented on UN maps, to weapons of parents and the birth to them of a malformed child

**These data anticipate a long-term effect of exposure to weapons on the prevalence of birth defects**

Looking into these proofs and correlations,  
one by one

First, the proof of presence of metals in the  
weapons without fragments



# Direct proof of presence of teratogen/carcinogen metals in weapons without fragments used since 2002



**A**



**B**



**C\***



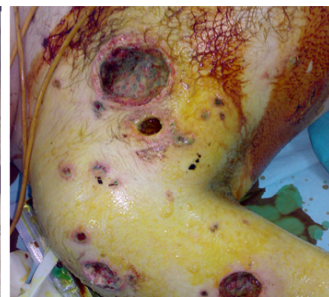
**D**



**E**



**F\***



**G**



**H**

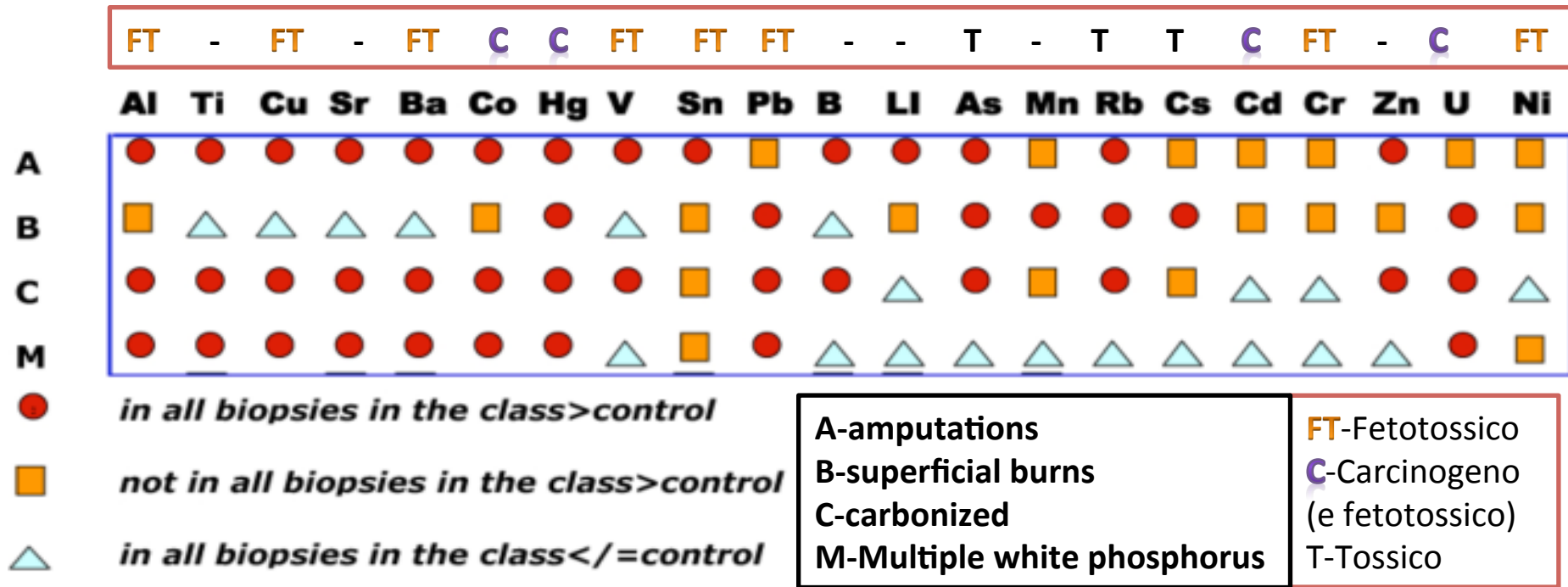


**I\***

the wounds analyzed from Gaza victims in 2006 and 2009

- -Skaik S, Abu-Shaban N, Abu-Shaban N, Barbieri M, Barbieri M, Giani U, Manduca P.
- Metals detected by ICP/MS in wound tissue of war injuries without fragments in Gaza. *BMC Int Health Hum Rights*. 2010

# Quantity of each metal in weapons that cause different kinds of wounds



Type and amount of metals in the wounds correspond to the type of wound, revealing a specific "metal signature" for injury, similar in biopsies of victims in 2006 and 2009.

Lead, uranium, aluminum, titanium, copper, strontium, barium, cobalt, mercury, vanadium, cesium, and tin were found in tissues from injuries by weapons without fragments.

The presence in the wounds of these metals, toxic, fetotoxic and/or carcinogenic suggests that they were spread in the environment by the weapons that caused them.

Also bomb craters (2006 and 2009) and white phosphorus munitions contain toxic / teratogenic / carcinogenic metals:

Molybdenum, mercury, aluminum, tungsten was found in both; cadmium and cobalt only in bomb craters





## **Direct proof of assumption**

**of teratogen metals by children.**

**Metals were measured in their hair ten months after  
Cast Lead**

**Measurement of metal load accumulated in last  
4-5 months in the hair of 95 children shows in  
57 cases it contamination by toxicant and  
teratogen weapon components.**

**This also implies that the metals persisted in  
the environment.**

*-Manduca P, Barbieri M, Barbieri Metals detected in Palestinian children's hair suggest environmental contamination.<http://www.newweapons.org> fall 2010*

# Direct evidence of teratogenic metals intake by children 1 year after Operation Cast Lead

**W \***  
**Pb \***  
**U \***  
**Be \***  
**Cr \***  
**Co**

**GZ > BH = BL**

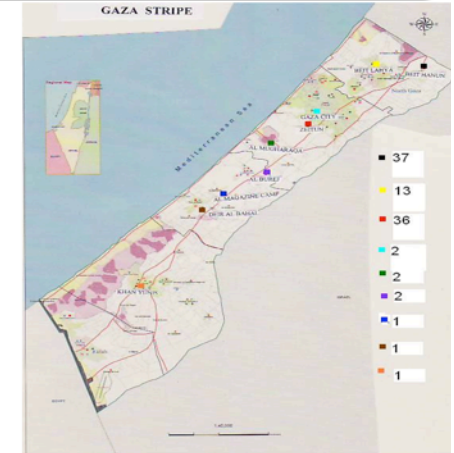
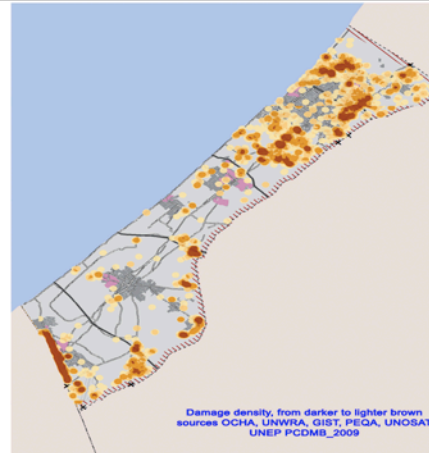
**V \***  
**Sr \***  
**Mo \***  
**Cd +**  
**As +**  
**Mn +**

**GZ > BH > BL**

**Al** very high in all samples

Also in WP ammunition  
 Blue carcinogens-  
 red toxic-  
 green possible carcinogen

\* Values higher than analytical Control and world sampling averages.



GZ-Gaza Zeitun-city  
 BH-Beit Hanoun-North  
 BL-Beit Layhia- Mid aerea



**Published on line:** Manduca P, Barbieri M, Barbieri *Metals detected in Palestinian children's hair suggest environmental contamination.* <http://www.newweapons.org/?q=node/112>, March 2010

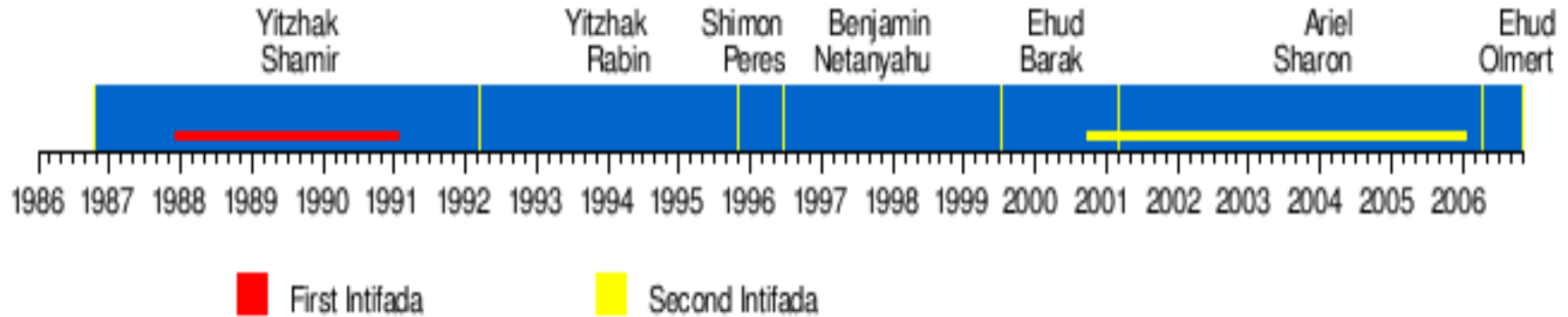
One of the most serious health effects of metal contamination is due to their capability to promote malformations (teratogen action).

They can also act as carcinogens

# **Temporal correlation between the use of weapons and the increase in the prevalence of birth defects**

**Increase in the presentation of congenital malformations in Gaza began in 2005 and was continuing in 2010.**

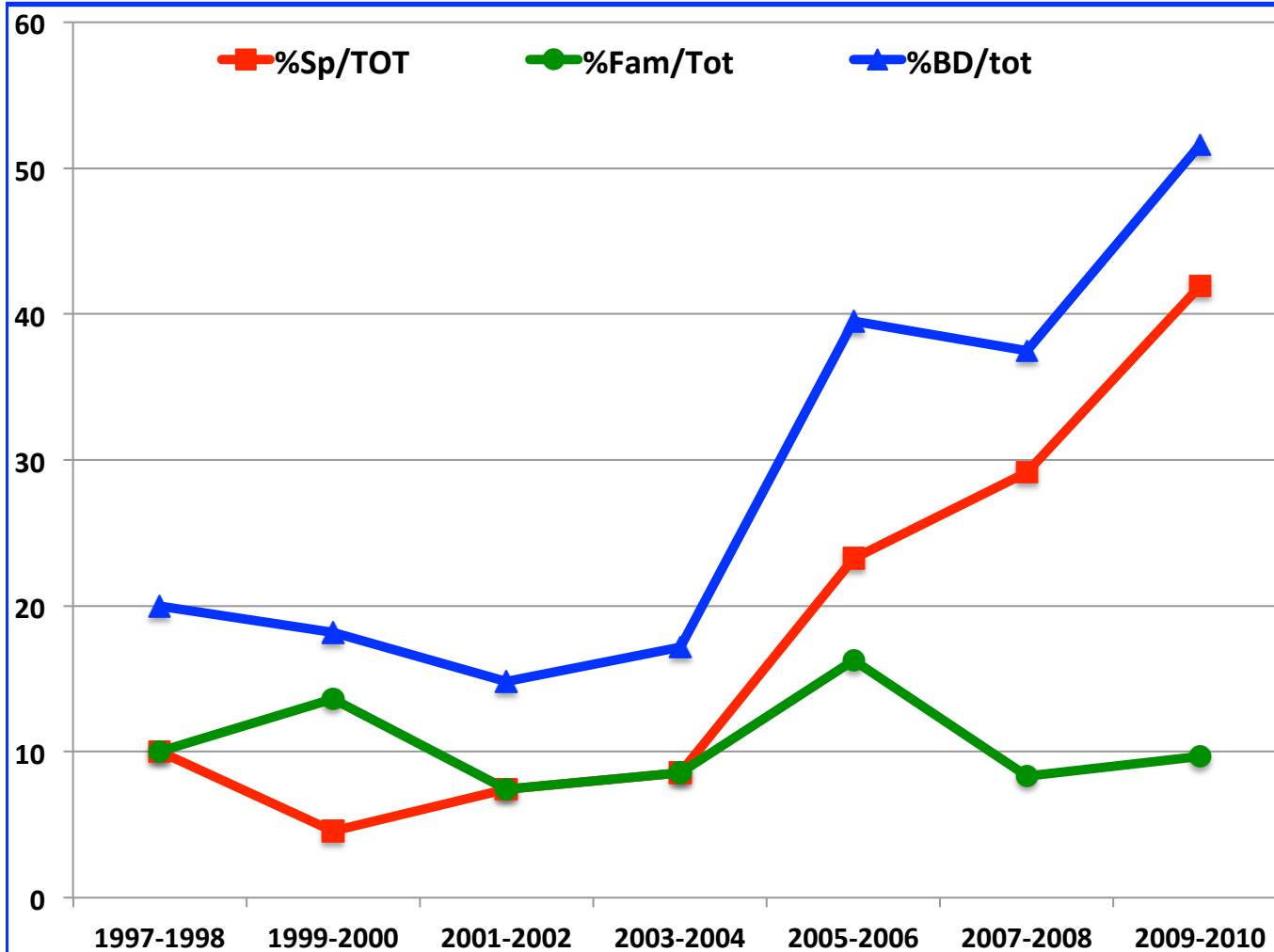
**There is a positive correlation in time between the increasing use of weapons delivered by aircraft and armored vehicles (as shown by the history of such attacks and their frequency) and increased malformations, in particular, increase of sporadic cases, not due to pre-existing genetic damage in the family .**



With the second intifada (2001) began the use by the Israeli occupation forces of ammunition metal augmented weapons, thermobaric munitions, missiles and air attacks.

Since in 2006 in Gaza the attacks with penetration bombs and new weapons without fragments were recorded, and these were proven to contain teratogenic metals.

Significant trend of increase of "sporadic" (Sp,  $p < 0.001$ ) malformations, but not of "familiar" (Fam,  $p = 0.59$ ) ones, suggests induction of their occurrence by the environment.



**% of malformations (BD) on the total number of births in families with a normal newborn baby born in 2011 and with an previous child with birth defect.**

**For Sporadic malformations  
Cochran-Armitrage trend test  $p < 0.001$**

**For familiar malformations  
Cochran-Armitrage trend test  $p = 0.59$**

*A.Naim, R. Minutolo, S.Signoriello, P. Manduca Prevalence of birth defects in the Gaza Strip, occupied Palestinian territory, from 1997 to 2010: Pedigree analysis . Lancet LPHA, in press*

## Correlation between the exposure of parents and birth defects in offspring

Parents with exposure to war events, recorded on maps of the United Nations, have children with birth defects more often than non-exposed couples.

Data were recorded two years after Cast Lead

**And 'highly significant correlation was observed between exposure of parental couples to white phosphorus (WP) during Operation Cast Lead and the offspring with malformations in 2011 (27% exposed versus 1.7% for parents with normal children), thus for children conceived 22-26 months after exposure.**

**Couples with children with malformations were exposed to white phosphorus, 15 times more often than those with normal children.**

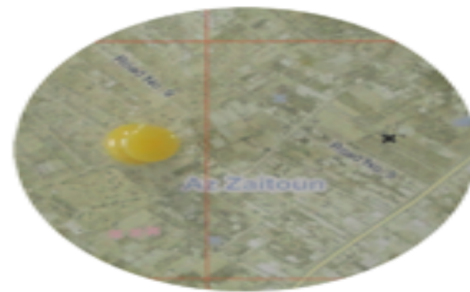
**Parents of children with congenital malformations were also exposed to bombs (20.4%), bombs and WP (18.2%). Exposure declared by couples was corresponding to the mapping of the events by the United Nations Mine Team.**

*A Naim, et al. Birth Defects in Gaza: Prevalence, Types, Familiarity and Correlation with Environmental Factors Int. J. Environ. Res. Public Health 2012, 9, 1732*

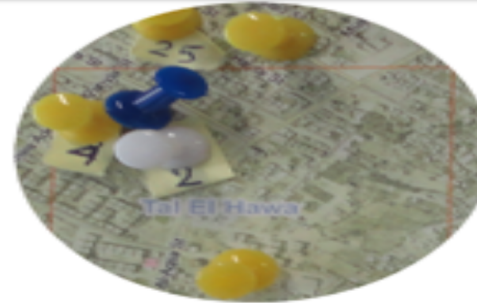
*A Naim, et al., Structural birth defects in the Gaza Strip, occupied Palestinian territory: a cohort study. October 8, 2012, Lancet*



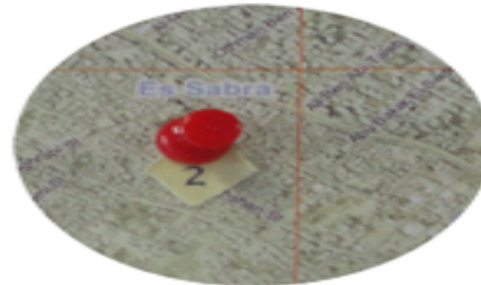
# UNSCO data on Ocha maps confirm parents report of exposures



**Zeitun**



**Tal HAwa**



**Es SAbra**



**Ash Sheik Radwanh**



**From Al Tofha to Beith Lahiya**

# SUMMARY of FINDINGS

We have shown

1- **Proof of fact** of toxicant teratogen carcinogen metal's presence in weaponry and of these metals in craters and white phosphorus ammunitions

2- **Presence of** of toxicant, teratogen, carcinogen metals accumulating in the hair of children in December 2009, **and their permanence in the post war environment**

**3- time correlation** between introduction of toxicant, teratogen, carcinogen metal containing weaponry and **increase of malformation in the population**

**4- correlation of parent's exposure** to weaponry with malformation in their progeny conceived up to 2 years later and possible **long term effect of war remnants** in determining reproductive damage

# CONCLUSIONS

Teratogenic / carcinogenic metals were introduced with weapons used since 2002

The people assumed them, from the contaminated area for at least a year after the attacks

The exposure of the parents to the war events is significantly related to having an offspring with birth defect, even two years after the events

The increasing use of aerial bombing is associated with a continuous increase of congenital malformations in the general population

**There is association between the use of weapons on the people of Gaza and permanent and long-term effects on reproductive health**

## The last questions we asked and answered:

Are the metals contaminants in weapons used in Gaza really present in malformed children?

Are they therefore potentially responsible of the malformation?

If so, specifically which metals are involved?

## Comparison of newborns with or without BD

<b>Metal</b>	<b>Newborn with BD <i>Gaza 2011 (48)</i></b>	<b>Normal newborn <i>Gaza 2011 (12)</i></b>	<b>p-value*</b>
<b>Sn</b>	<b>0.23 (0.08-0.54)</b>	<b>0.04 (0.02-0.09)</b>	<b>0.002</b>
<b>Ba</b>	0.74 (0.51-1.27)	0.60 (0.37-0.73)	0.154
<b>W</b>	0.03 (0.02-0.07)	0.02 (0.01-0.04)	0.365
<b>Hg</b>	<b>0.93 (0.02-0.25)</b>	<b>0.00 (0.00-0.02)</b>	<b>0.003</b>
<b>Pb</b>	0.81 (0.49-1.16)	0.60 (0.52-1.21)	0.820
<b>U</b>	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.164
<b>Se</b>	<b>0.32 (0.22-0.47)</b>	<b>0.13 (0.09-0.24)</b>	<b>0.004</b>
<b>Sb</b>	0-03 (0.02- 0.06)	0.05 (0.04-0.11)	0.160
<b>Cd</b>	0-03 (0.02- 0.06)	0.05 (0.03-0.09)	0.143
<b>Cr</b>	0.41 (0.29- 0.59)	0.78 (0.38-1.17)	0.053

Data are median values for ppm and Interquartile range (IQR)

\*(Wilcoxon-Mann-Whitney )

**Newborns with birth defects (48) have a load of mercury, selenium (both teratogens) and tin (toxicant) in the hair significantly higher than normal newborns (12).**

We found teratogen metals present in weapons in the hair of newborns with malformations in amounts significantly higher than in those of normal newborns.

**The metals identified are teratogenic agents, thus they are potentially responsible for inducing the malformations.**

**Newborns can only have received these metals from the mother during gestation.**

**Mothers could have accumulated the metals in their body at a previous time, when exposed directly to the weapons, and release them during pregnancy, or they may be assuming them continuously from a still contaminated environment.**



# DOCUMENTATION

## PUBLISHED IN SCIENTIFIC JOURNALS WITH REFEREES

-Skaik S, Abu-Shaban N, Abu-Shaban N, Barbieri M, Barbieri M, Giani U, Manduca P.

Metals detected by ICP/MS in wound tissue of war injuries without fragments in Gaza. BMC Int Health Hum Rights. 2010

-A Naim, et al. Birth Defects in Gaza: Prevalence, Types, Familiarity and Correlation with Environmental Factors Int. J. Environ. Res. Public Health 2012, 9, 1732

-A Naim, et al., Structural birth defects in the Gaza Strip, occupied Palestinian territory: a cohort study. October 8, 2012, Lancet

-Naim A, Al Dalies H, El Balawi M, Salem E, Al Meziny K, Al Shawwa R, Minutolo R, Manduca P. Birth defects in Gaza: prevalence, types, familiarity and correlation with environmental factors. Int J Environ Res Public Health. 2012 May;9(5):1732-47. Epub 2012 May 7.

PUBLISHED IN SCIENTIFIC JOURNALS WITH REFEREES continuation

-A.Naim, R. Minutolo, S.Signoriello, P. Manduca Prevalence of birth defects in the Gaza Strip, occupied Palestinian territory, from 1997 to 2010: Pedigree analysis . Lancet LPHA, 2013

-Manduca P, Naim A, Signoriello S. Metal contamination in newborns with congenital birth defects, born at Al Shifa Hospital, Gaza, Palestine in 2011: an observational study. Lancet LPHA, 2014, accepted

*PUBLISHED ON LINE*

- M a n d u c a B a r b i e r i M , B a r b i e r i  
Gaza Strip, soil has been contaminated due to bombings: population in danger.  
<http://www.newweapons.org/?q=node/110#attachments>, January 2010

-Manduca P, Barbieri M, Barbieri *Metals detected in Palestinian children's hair suggest environmental contamination.*<http://www.newweapons.org> fall 2010

