



Presented by Paola Manduca

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on behalf of MANY Co-AUTHORS

First Global Congress in Conflict Medicine

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**Long term risks of increase in NCD in war
aftermath: changes in reproductive health in
Gaza, Palestine, factors involved, and legacies**

Research since 2010 was in collaboration with

in Gaza

Skaik S, Abu-Shaban N, Abu-Shaban N, Al Dalies H, El Balawi M, Salem E,

Al Meziny K, *Al Shifa Hospital*

Naim A, *Palestinian Energy & Natural Resources Authority*

Baraquni N, *Pediatric Hospital Nasser- IUG*

Abed Y, Diab S, *Al Quds University*

Mokallalathi M, Quta S, *Islamic University*

Raneem al Shawwa IT technician

teams of midwives (4+5+6) *Al Shifa, Al Awda, Al Thaher, Al Aqsa Maternities,*

in EU

Minutolo R, Signoriello S, Giani U, *Università di Napoli, Italy*

Barbieri M, Barbieri M, *Università la Sapienza, Roma, Italy*

Punamaki R. *Univeristy of Tampere, Finland*

Minichielli F., Bianchi F. *University of Pisa, Italy*

Funding since 2010

Cooperazione internazionale Italiana

Interpal, UK-Gaza

Perdana Foundation, Malaysia

Trauma surgeons, Norway

NWRG, Italy

Jacobs Foundation

Medicines Belgium

Salaam association, Italy

Surgeons for children, Italy

many individual donors

Professional competences of the people
of Newweapons are in health and science
and the commitment is to be :

*on the side of those injured by war and
other social injustices*

using scientific tools
assessing health damages
bringing proofs of causes of damages
searching for remedies



Today's message

We identified one main factor introduced by war and that is capable of long term effects on health.

This is the extensive, persisting contamination, trans-passing the placenta, by heavy metals delivered by weapons.

The teratogen and toxicant effects on reproductive health have been documented and quantified in Gaza, Palestine.



PUBLISHED IN SCIENTIFIC JOURNALS

-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 LPHA

-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.

- Yehia Abed, Nabil Al Barqouni, Awny Naim and Paola Manduca Comparative Study Of Major Congenital Birth Defects In Children Of 0-2 Years Of Age In The Gaza Strip, Palestine International Journal of Development Research Vol. 4 2319-2323, 2014



-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

-Manduca P, Naim A, Signoriello S

[Specific association of teratogen and toxicant metals in hair of newborns with congenital birth defects or developmentally premature birth in a cohort of couples with documented parental exposure to military attacks: observational study at Al Shifa Hospital, Gaza, Palestine.](#) Int J Environ Res Public Health. 2014 May 14;11(5):5208-23

--Manduca P, Diab SY, Quta SR, Albaraquni NMA, Punamäki RL A cross-sectional study of the relationship between the exposure of pregnant women to military attacks in 2014 in Gaza and the load of heavy-metal contaminants in the hair of mothers and newborns. BMJOpen, 2017, *in press*



Opinion papers

-Manduca P. Starting from rubble: Collateral victims not accounted for? Long term health effects of the last war of Israel on next generation of Gaza people

<http://www.bmj.com/content/349/bmj.g5106/rr/763475>

-Manduca P, Chalmers I, Summerfield D, Gilbert M, Ang S

[Israel-Gaza conflict - Authors' reply](#). Lancet. 2014 Aug 30;384(9945):746. doi: 10.1016/S0140-6736(14)61316-7. Epub 2014 Aug 22. No abstract available.

-Manduca P, Chalmers I, Summerfield D, Gilbert M, Ang S.

[An open letter for the people in Gaza](#). Lancet. 2014 Aug 2;384(9941):397-8. doi: 10.1016/S0140-6736(14)61044-8. Epub 2014 Jul 23.

PUBLISHED ON LINE

-Manduca Barbieri M, Barbieri

[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> 2010



We began alerted by Lebanon and
Gaza doctors in 2006

They documented the use of weaponry not
leaving fragments in the wounds, very similar
images of the wounds come from the two
places

WEAPOS THAT LEAVE NO FRAGMENTS



Comparison of
victims with
amputations in
2006
in

<----**TYRE**

Dr.Faray

<----**GAZA**

Dr.Saqqqa





Tyre, 2006



Gaza, 2006



Gaza, 2006



Tyre, 2006

Photo
Gaza, dr Saqqa
Tyre, dr.Faray





Gaza 2006



Tyre 2006

*Photo
Gaza, Gazzella
Tyre, dr.Faray*



Metal augmented weaponry that can act as “molecular saw” and metal augmented ammunitions were reported as new development in military field literature .

Heavy metals are in “penetrators” ammunitions of many sizes.

These are industrially produced and used at least since the first Iraq war and were used in Lebanon and Gaza in 2006.

Step by step the investigation that document
today's message

Heavy metals

1-Are toxic, carcinogen and teratogen.

Can induce birth defects, prematurity, not communicable diseases and cancer.

2-Persist in the environment for very long time.

Can be continual source of intake through skin, and by inalation, ingestion.

3-Accumualte in living.

Can reach in time threshold levels effective to damage through chronic exposure.

4-Act primarily with epigenetic mechanisms, not as mutagens.

Remediation, reduction of effects may be possible.

RESULTS OF RESEARCH - STEP by STEP

- **IDENTIFICATION OF THE PRESENCE OF HEAVY METALS IN THE ENVIRONMENT POST-WAR AND IN AMMUNITIONS**
- HEAVY METALS WAR REMNANTS IN WOUND TISSUE—PROOF OF FACT THEY WERE DELIVERED BY THE WEAPON
- CONTAMINATION OF THE POPULATION
- CORRELATION OF EXPOSURE TO ATTACKS WITH NEGATIVE EVENTS AT BIRTH
- SPECIFIC HEAVY METALS CONTAMINATE IN UTERO BIRTH DEFECTS AND PRETERM NEWBORNS
- PERSISTANCE OF HUMAN CONTAMINATION IN TIME AND INCREASE IN WOMEN EXPOSED TO ATTACKS IN 2014
- INCREASE IN PRETERM AND BIRTH DEFECTS IN TIME FROM 2011 TO 2016

Heavy metals delivered in the Gaza environment by weapons



Alluminium, molybden, tungsten, mercury

Estimated 3500 White Phosphorus ammunitions used During Cast lead -Gaza



Cast lead 2008-09- analytical findings

Bomb craters in 2006 and 2008-09, Gaza tungsten, mercury, cobalt, barium, cadmium

*Mercury is carcinogen and teratogen.
Tungsten is genotoxic and carcinogen.
Cadmium and Cobalt are carcinogens.
Barium is fetotoxicant*



Heavy metals pulverized from weaponry are found in the environment at hit sites and in ammunitions.

Are delivered form the air by white phosphorus shells, used in 2008-09 in Operation Cast lead.

Metals delivering weapons were then used in 2012, 2014 in Gaza.



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Direct proof teratogen/carcinogen metals are delivered by weapons in the tissue of wounds without fragments



A



B



C*



D



E



F*



G



H



I*

wounds analyzed from Gaza victims in 2006 and 2009



18 biopsies derived from 15 victims of war-derived injuries, 4 in 2006 and 9 in 2009 were analyzed by ICP/MS for heavy metal content and amount. Controls were skin from areas not wounded and deeper layers of the parenchima from the same victim.

Kind and amounts of metals correlate with clinical classification of injuries, exposing a specific metal signature, similar for the biopsies from 2006 and 2009.

Amputee & Carbonized : Al, Cu, Sr, Ba, Co, Hg, V, Cs, Sn , Pb, U, B, As, Mn, Rb, Cd, Cr, Zn, Ni

Multiple dots (WP): Al, Cu, Sr, Ba, Co, Hg, Pb, U, Ti

Burns : Co, Hg, Cs, Sn

Red teratogens

Yellow both carcinogens and teratogens

Green carcinogen only in some form



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The metals delivered by weapons remain in the environment and population intakes them in time.

Hair is one of the place heavy metals are deposited and test of hair metal load is the least invasive and most effective tool for assessing animal contamination according to IAE

10 months after Cast lead

The metal load, measured in the hair of 95 children in the Gaza strip, showed that contamination by weapon delivered heavy metals was ongoing and involved 69% of the children tested.



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Retrospective study in Pediatric Hospitals

Frequency of major birth defects per 1000 admissions in all Pediatric hospitals of the Gaza strip in the first six months of 2006 or 2010

First 6 months of year	2006	2010	P value
BD patients	273	331	
Total 0-2 year old patients	6920	5254	
Frequency of BD (0 -2 Y.)	→ 39.5/1000	→ 63/1000	<0.001
Total 0-12 year old patients	10136	7201	
Frequency of BD (0 -12 Y.)	→ 27/1000	→ 46/1000	<0.001
Estimated Children (0 -2 Y.)*	93,760	98,064	

Yehia A. et al. Comparative Study Of Major Congenital Birth Defects In Children Of 0-2 Years Of Age In The Gaza Strip, Palestine Int. J.Dev. Res.2319-2323, 2014



**When increase in birth defects occurs in a short time
this implies the action of environmental effectors**



Surveillance of reproductive health is the best tool to detect risk from environmental contaminants on the population.

Surveillance is done by registration at birth

An essential tool for obtaining data to understand the relationship between circumstances/causes and effects is the development of an adequate questionnaire.

This requires knowing the life conditions and history of a population.

We started the first birth register for Gaza after developing an “ad hoc “ questionnaire and worked in the major maternity, al Shifa hospital, since 2011.

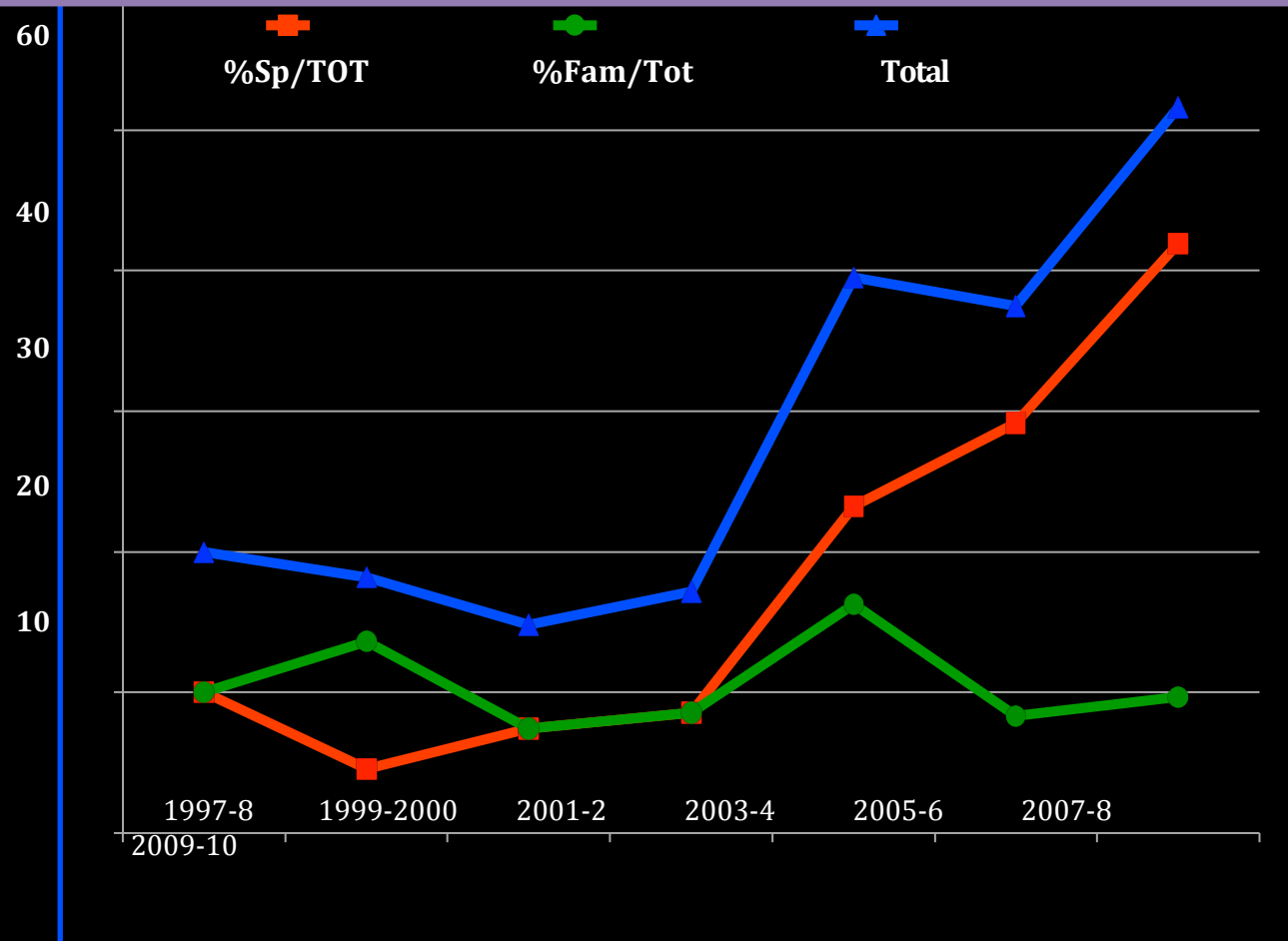


Outcomes of the registry:

- Baseline of the incidence of birth defects and prematurity
- Building a pattern of the presentation of birth defects in time since the late nineties
- Demonstration of the correlation between mother's exposure to military attacks and the newborn's phenotype
- Demonstration of the association of a newborn phenotype with his "in utero" intake of specific heavy metals

Birth defects

Significant trend of increase was found for novel “sporadic” (Sp) malformations ($p < 0.001$), but not for “familiar” (Fam) ones ($p = 0.59$), implying environmental induction of their occurrence



% of previous Birth defects /BD/ in families with normal newborn in 2011 From 1998 to 2010

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 PalesHnian territory, from 1997 to 2010: Pedigree analysis . Lancet LPHA, 2013



Birth defects registered in 2011 were associated to mother exposure to white phosphorus ($p < 0.001$) and bombing during Cast lead {exposure objectively assessed on UNMAT maps}

Exposure to WP and bombing of mothers

N of Newborns	no exposure	WP	bombs	WP + bombs
normal	2933 (98,3)	49 (1,7%)	NA	NA
birth defect	44 (78,5)	12 (27,2%)	9 (20%)	8 (18%)

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

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



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Direct association of exposure with newborn with birth defects contamination in utero

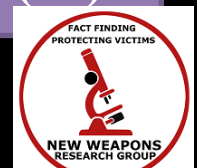
Comparison of metal load in newborn with or without birth defects

Metal	Newborn with BD Gaza 2011 (48)	Normal newborn Gaza 2011 (12)	p-value*
Sn	0.23% (0.08-0.54)	0.04% (0.02-0.09)	0.002
Ba	0.74% (0.51-1.27)	0.60% (0.37-0.73)	0.154
W	0.03% (0.02-0.07)	0.02% (0.01-0.04)	0.365
Hg	0.93% (0.02-0.25)	0.00% (0.00-0.02)	0.003
Pb	0.81% (0.49-1.16)	0.60% (0.52-1.21)	0.820
U	0.00% (0.00-0.00)	0.00% (0.00-0.00)	0.164
Se	0.32% (0.22-0.47)	0.13% (0.09-0.24)	0.004
Sb	0 (0-0.06)	0.05% (0.04-0.11)	0.160
Cd	0 (0-0.06)	0.05% (0.03-0.09)	0.143
Cr	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 significantly higher load of mercury, selenium (teratogens) and tin (toxicant) in the hair than normal newborns (12).



For the occurrence of birth defects there is both circumstantial evidence of correlation with mother exposure to attacks and analytical evidences of contamination by specific teratogen metals “in utero” of the newborn

These facts link directly birth defects incidence with the deployment of metal augmented weaponry on Gaza.



Premature newborn have a different contamination that BD children

Comparison of newborns at term and preterm +low birth weight

Metal	Prematurely born <i>Gaza 2011 (9)</i>	Normal Newborn <i>Gaza 2011 (12)</i>	p-value*
Sn	0.25 (0.23-0.89)	0.04 (0.02-0.09)	0.002
Ba	1.07 (0.62-1.58)	0.60 (0.37-0.73)	0.030
W	0.03 (0.02-0.03)	0.02 (0.01-0.03)	0.190
Hg	0.00 (0.00-0.05)	0.00 (0.00-0.02)	0.470
Pb	1.06 (0.73-2.10)	0.60 (0.52-1.21)	0.190
Se	0.05 (0.00-0.17)	0.13 (0.09-0.24)	0.160
Sb	0.06 (0.02-0.17)	0.05 (0.04-0.11)	0.550
Cd	0.08 (0.06-0.09)	0.05 (0.03-0.09)	0.280
Cr	0.75 (0.46-0.78)	0.78 (0.38-1.17)	0.810

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





July 16, 2014 -Gaza city beach- second hit



8a



Gaza july 2014

8b



Gaza July 2014

1 & 5



Gaza july 2014

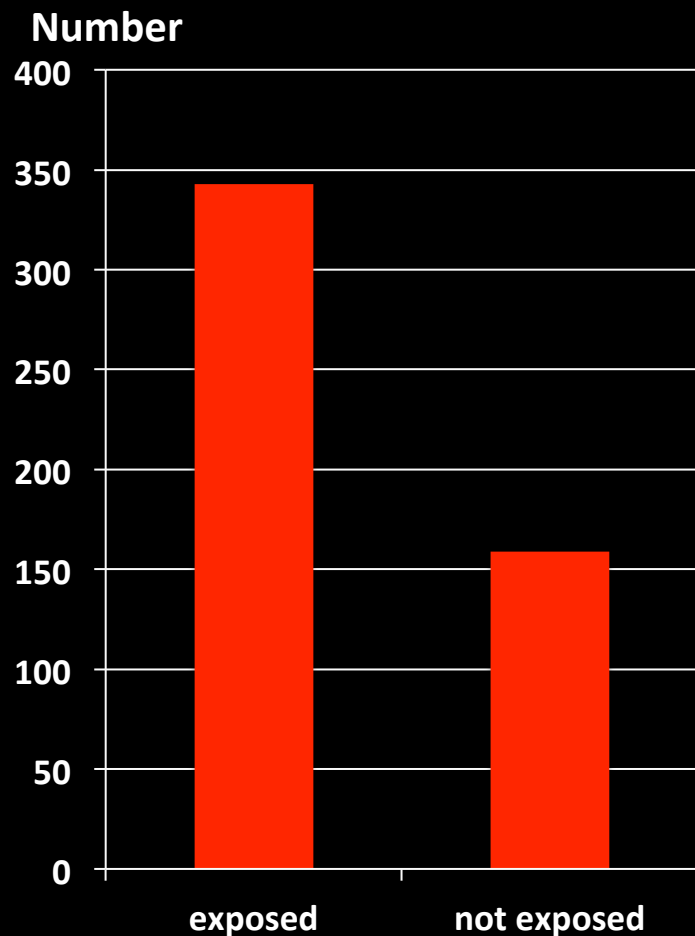
Main concerns after the 2014 attacks were about increased heavy metal contamination with the potentially increased risk of negative outcomes in long term

In 2015 assessment of contamination

- In 2015 and 2016, incidence of reproductive damages
- - starting 2015, longitudinal assessment of developmental and physical health, ongoing



Circumstance in 2014 attacks



500 women participated that were pregnant in the first trimester during the war and were recruited at delivery

68% women were exposed to direct or next house attacks (343/502).

In 105 cases we documented the damages

Exposed - Women own house or next door was hit in attack .

Not exposed - Women own house or next door was not hit in attack.



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- SPECIFIC HEAVY METALS CONTAMINATE IN UTERO BIRTH DEFECTS AND PRETERM NEWBORNS
- **HUMAN CONTAMINATION IS HIGHEST IN WOMEN EXPOSED TO ATTACKS IN 2014, AND IS PERSISTANT FROM PREVIOUS ATTACKS**
- INCREASE IN PRETERM AND BIRTH DEFECTS IN TIME FROM 2011 TO 2016

The women directly exposed to attacks have significantly higher load in hair for most heavy metals than those not exposed

Metal	Exposed	95% CI	Not exposed	95% CI	Difference	P> t	95%CI - INF	95%CI -SUP
Al	6,1	5.59-6.61	5,17	4.49-5.85	0,9299998	0,032	0,0813438	1,778656
Fe	14,26	13.33-15.19	14,76	13.52-16	-0,5	0,527	-2,053229	1,053229
Mg	518	476.47-559.53	436	380.7-491.3	82	0,02	12,8438	151,1562
Mn	0,77	0.69-0.85	0,58	0.48-0.68	0,19	0,004	0,0594475	0,3205525
Ba	5,45	4.62-6.28	3,79	2.69-4.89	1,66	0,018	0,2801481	3,039852
As	0,077	0.07-0.08	0,059	0.05-0.07	0,018	0,007	0,0048824	0,0311176
Cd	0,0466	0.04-0.05	0,0429	0.03-0.05	0,0037	0,537	-0,0080632	0,0154632
Co	0,05	0.04-0.06	0,04	0.03-0.05	0,01	0,087	-0,0014529	0,0214529
Cr	0,67	0.59-0.75	0,58	0.47-0.69	0,09	0,2	-0,0477462	0,2277463
Cu	12,7	11.88-13.52	12,8	11.71-13.89	-0,1000004	0,885	-1,463699	1,263698
Hg	0,188	0.16-0.22	0,198	0.16-0.24	-0,01	0,677	-0,0571568	0,0371568
Ni	0,65	0.56-0.74	0,46	0.34-0.58	0,19	0,01	0,0461767	0,3338233
Pb	1,59	1.32-1.86	1,43	1.07-1.79	0,1600001	0,479	-0,2842991	0,6042993
Sr	48	44.06-51.94	45,4	40.16-50.64	2,5999998	0,436	-3,953596	9,153592
Ti	0,27	0.24-0.3	0,22	0.19-0.25	0,05	0,024	0,0066297	0,0933703
U	0,13	0.11-0.15	0,177	0.15-0.2	-0,047	0,003	-0,0779462	-0,0160538
V	0,453	0.4-0.51	0,291	0.22-0.37	0,162	0,001	0,0682058	0,2557942
W	0,03	0.03-0.03	0,03	0.02-0.04	0	1	-0,0076353	0,0076353
Zn	296,93	270.11-323.75	250,72	215-286.44	46,20999	0,043	1,542475	90,87751

winter 2015- heavy metals contamination is above references from not war areas for all 502 women tested

Metal	95°percentile	95 CI		95°percentile	comparison with ref	
2015 Mothers (N=500)					reference German	+ = p<0.05
Al	16,91	13,88	21,68	<8	+	
Fe	40,16	35,25	52,28	1.6-17	+	
Mg	1260	1123,87	1457,87	20-130	+++	
Mn	2,9	2,38	3,44	0,05-0,92	+	
Ba	29,69	24,04	49,18	<4,64	+	
As	0,24	0,21	0,28	<0,2	+	
Cd	0,24	0,2	0,3	<0,2	+	
Co	0,57	0,37	0,76	0,01-0,30	+	
Cr	2,93	2,43	3,29	0,02-0,21	+	
Cs	0	0	0	<0,01	ND	
Cu	40,73	33,6	52,24	10--41	=	
Hg	1,62	1,16	4,84	<0.60	+	
Mo	0,26	0,21	0,32	0,03-1,00	=	
Ni	2,76	2,23	3,56	<1.00	+	
Pb	6,5	6	7,35	<3,0	+	
Se	0,88	0,86	0,95	0,40-1,70	=	
Sn	0,75	0,61	0,98	<0.70	=	
Sr	136	122,39	160,26	0,65-6,90	++	
Ti	0,82	0,73	1	<1,50	-	
U	0,53	0,46	0,68	<0,10	+	
V	1,4	1,26	1,56	0,01-0,20	++	
W	1,37	1,07	2,28	<0,02	+++	
Zn	990,55	902,21	1202,86	150-272	++	

Beside exposure to attacks, no other known anthropometric source of heavy metals was found to explain these result.



Health at birth from 2011 to 2016

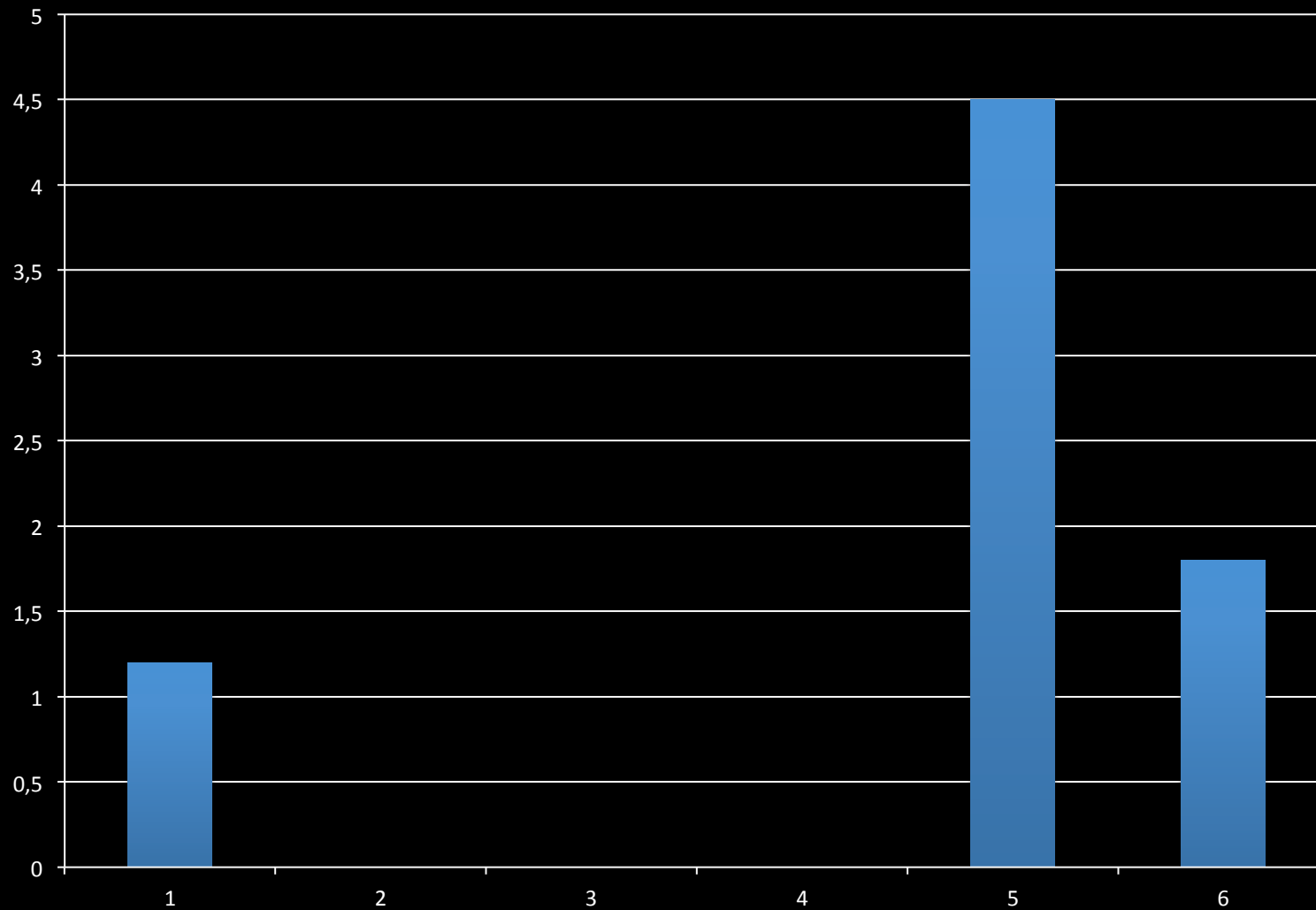
The outcome studied in 2016 is the incidence of major birth defects and prematurity



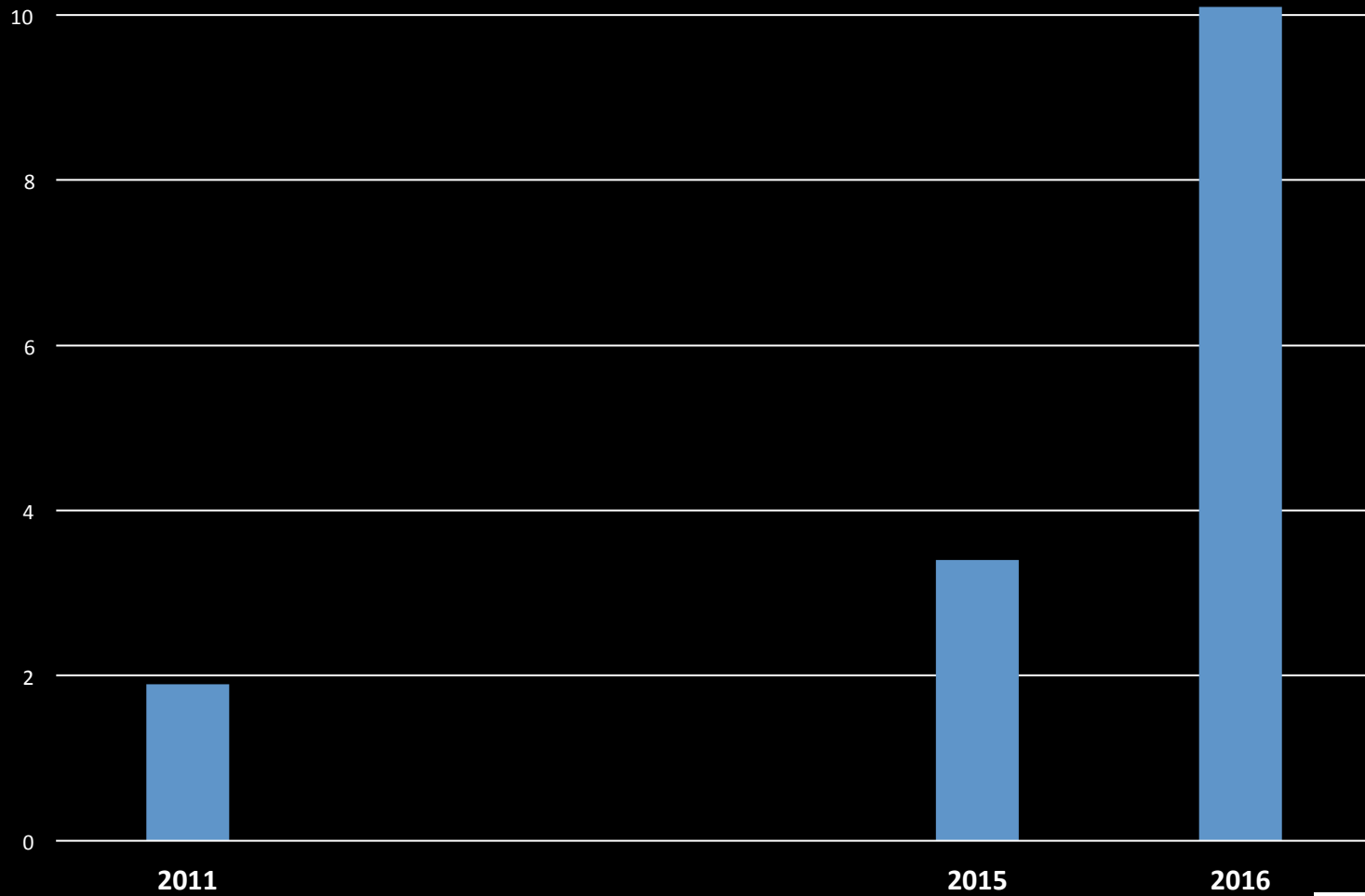
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Registration of births –Incidence (%) of major birth defects from 2011 to 2016 at Shifa Hospital



Registration at birth - incidence (%) of Premature births at Shifa Hospital



HIDDEN VICTIMS CAN BE COUNTED

PRETERM AND BIRTH DEFECTS ARE LEADING CAUSES OF PERINATAL DEATHS (ABOUT 30% AND RESPECTIVELY 25% OF BABIES WITH THESE CONDITIONS DIE)

THE INCREASE IN BIRTH DEFECTS AND PRETERM COMPARED TO 2011 HAS CAUSED IN 2016 AN ESTIMATED ADDITIONAL TOLL OF 1500 PERINATAL DEATHS

THIS ARE NUMBERS HIGHER THAN THAT OF CHILDREN KILLED DIRECTLY IN THE 2014 WAR

WE DO NOT KNOW THIS LOSS OF NEWBORNS WILL CONTINUE TO INCREASE, STABILIZE OR DECREASE



IN SUMMARY

-IT IS DOCUMENTED THE PERSISTENCE FOR YEARS IN GAZA OF HUMAN CONTAMINATION BY HEAVY METALS WAR-REMNANTS IN THE ENVIRONMENT.

-THERE IS SCIENTIFIC EVIDENCE FROM GAZA ABOUT THE NEGATIVE EFFECTS OF HEAVY METALS DELIVERED BY WEAPONRY ON REPRODUCTIVE HEALTH.

-IS DOCUMENTED THE INCREASE IN TIME OF THESE NEGATIVE EFFECTS ON NEWBORN HEALTH AND THEIR TOLL CAN BE MEASURED.



IN ADDITION

HEAVY METALS CAN INDUCE TUMORS, MALE INFERTILITY AND CHRONIC DISEASES

The hidden toll on tumors, NDC and male infertility has not yet been studied.

THE HEALTH RISKS BY WEAPONRY IS LIKELY SIMILAR IN ALL WAR AREAS.

No scientific studies have been conducted systematically yet anywhere



ACTIONS

- BIOLOGICAL ACTION OF HEAVY METAL CONTAMINANTS IS PRIMARELY EPHYGENETIC AND HUMAN CONTAMINATION COULD BE TARGETED WITH **REMEDIES**
- CANCER AND OTHER NCD ARE LIKELY TO HAVE INCREASED IN POST-WAR AREAS BECAUSE HEAVY METALS ARE CARCINOGENS AND TOXICANTS - OUR APPROACH COULD BE NOW **EXTENDED** TO STUDIES IN OTHER AREAS AND TO ASSESS THE PREVALENCE OF OTHER NCD IN GAZA.



IN DETAIL ABOUT CANCER

HEAVY METALS CAN INDUCE CANCER (AND OTHER NCD)

In Gaza, a rise in infants and children cancer is reported observationally and involves tumors usually rare in that age bracket- this is expected because many heavy metals are carcinogens.

→ RETROSPECTIVE STUDIES IN PEDIATRIC SPECIALISTIC HOSPITALS ARE POSSIBLE

→ APPROPRIATE REGISTERS CAN BE DESIGNED FOR PROSPECTIVE STUDIES

→ NOW EXISTING ARCHIVES OF BIRTHS INCLUDING RECORD OF MOTHERS EXPOSURE TO WAR OR OTHER TOXIC ENVIRONMENTS COULD BE USED FOR LONGITUDINAL STUDIES



And last

We have been doing since 2011 what in 2015 become one of the SDG of WHO.

Namely

“surveillance at birth and research of environmental correlations and causes for its eventual degeneration/possibility of improvement”

This recommendation was not acted upon yet in any of the postwar setting.

Independent scientists/doctors →



← WHO, IPS and BIG ONES

Will the elephant over ride the small bird? Is the road plain and earthly or there will be sea and mountains barriers for the elephant? Is the direction of their course the same ? Is the biological imprint of an elephant bearable in Gaza or other post war areas? Is the cost of an elephant sustainable in the context of high requests for all health services?

Our understanding of the situation as doctors and researchers suggests that:

In waiting for the arrival of the elephant, unscheduled till now, we need to continue and improve

Funding for training and registry and research need to be stabilized, giving the breath to projects that favors development of local autonomy and integration within the health system and developing trials for remedies.

We are very interested to extend horizontal collaborations in research and to include different competences



GENERAL METHODOLOGICAL ISSUES

ADEQUACY OF QUESTIONNAIRES (DEVELOPPED AD HOC)- VERY RELEVANT

RELIABILITY OF DATA ACQUISITION - PROSPECTIVE STUDIES

ACCURACY OF PROTOCOLS, BUILDING SKILLS AND PASSING TOOLS BY WORKING SIDE BY SIDE WITH LOCAL PROFESSIONALS AND STAFF

BUILDING FOR LONGITUDINAL STUDIES, AND DEVOLPING TOOLS FOR DATA RETRIEVAL

TRANSPARENCE IN AIMS



This work

Has documented in Gaza the long term effects of military attacks on the population and counted some of the “unaccounted for” victims in 2016.

It documents through research one major factor of health risk and gives the possibility to design remediation.

It points to the need to study cancer and other NCD within the frame for the epigenetic paradigm.



It offers tools amenable to develop longitudinal studies for these NCD

It suggests that the situation we have studied in depth in Gaza is paralleled by that in Iraq, Afghanistan (from where only dispersed reports are available) and is ongoing in all other areas of wars in the recent past, and in the present

**Thanks to the organizers of the Conflict Medicine meeting
and to AUB**



Palestinian resistent child -*E.I. photo, 2013*



NWRG-onlus, voluntary association of doctors and scientists
for research on environmental and genetic determinants of
health

Present aims of research: Study determinants of reproductive and child health - assess the changes in time, identify interfering environmental factors, prevent damage and find remedies.

I declare no conflict of interest and that no retribution was received for my professional work. The projects of research were approved by Genoa University up to late 2014, when I retired and always by the by local Institutions of Health within the frame of the Helsinki ethical rules of conduct for human studies.

RECCOMENDED ACTIONS IN GAZA AND IN GENERAL

→ Surveillance at birth as first and most informative presidium for health. It is also cheap. **MUST BE EXTENDED AND CONTINUED**

→ Longitudinal studies on infant/child health and development are possible. **THESE COULD START FROM BIRTH REGISTRY**

→ Human contamination could be targeted with remedies and babies lives preserved. **STUDIES AND TRIALS SHOULD BE DESIGNED**



OUR PERSPECTIVES

There is much that could be done for the first time on the basis of what was already ascertained scientifically.

WE ARE INTERESTED AND QUALIFIED FOR

->extending the surveillance at birth as first useful sentinel for population health, and the research towards remedies for metal contamination in Gaza

->designing an infant cancer study, retrospective and a registry with appropriate protocols in Gaza

WE CAN COLLABORATE IN

->investigating male infertility in war and post-war areas

