Presented by Paola Manduca

Professor of Genetics, President of the newweapons research groups – NWRG, Italy

on behalf of MANY Co-AUTHORS

first delivered in
London, April 9, 2019

Long term risks of increase in Not Communicable Deasess in war aftermath: changes in reproductive health in Gaza, Palestine, factors involved, and legacies

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

Document 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.

Preliminaries and motivations

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

on the side of those injuried by war and other social injustices, if they call on us

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

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

We began collaborations on calls issued by doctors by Lebanon and Gaza doctors in 2006

They documented the use of weaponry not leaving fragments in the wounds. In both places in 2006 very similar severe wounds without snarpels or fragments were reported

The knowledge we started with was jet uncertain

- «we conclude that there are relatively few environmental pollution exposures for which we can draw strong concluisione about the potential to cause congenital anomaliesand, if so, the chemical costituents implicated, to provide an evidence base for public health and clinical practice»

- *Helen Dolk and Martine Vrijheid. British Medical Bulletin 2003*

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

Heavy metals are in “penetrators” ammunitions of many sizes, produced and used at least since the first Iraqi war and used in Lebanon and Gaza in 2006.

WEAPOS THAT LEAVE NO FRAGMENTS

Comparison of victims with amputations in 2006 in

<----TYRE

Dr.Faray

<----GAZA

Dr.Saqqa

FACT FINDING PROTECTING VICTIMS

NEW WEAPONS RESEARCH GROUP

Tyre, 2006

Gaza, 2006

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

Gaza, 2006

Tyre, 2006

Photo
Gaza, dr Saqqa
Tyre, dr.Faray

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

Gaza 2006

Tyre 2006

Photo
Gaza, Gazzella
Tyre, dr.Faray

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

Thus we focused investigation on heavy metals because they are the main treat of long term effects on health in war and their aftermath

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, 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.

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

2009-2011 we worked with Iraqi colleagues and since 2010 for the last 9 years in Gaza

The tasks were

- To prove which heavy metals were indeed delivered by weapons
- If these were assumed by humans in amounts capable to affect reproductive health.
- For how long in the war aftermath they continue to be assumed by humans.
- Study, as end-point of health effects, the effect of metal contamination of mothers on their reproductive health
- Show if heacvy metals passagein utero to the baby

Today's message

We identified one main factor introduced by war: the capability of war-remnants metals of long term effects on health.

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

Negative effects on reproductive health and extent of contamination by metals have been documented and quantified along 8 years in Gaza, Palestine.

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Research in collaboration with

in Gaza

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

Al Meziny K, Bobol N. *Al Shifa Hospital*

Naim A, *Palestinain Energy & Natural Resources Authority*

Baraquni N, *Pediatric Hospital Nsser- IUG*

Abed Y, Diab S , *Al Quds University*

Mokallalathi M, Quta S, *Islamic University*

Abdel Kareem. *Taheer Hospital*

Raneem al Shawwa IT technician

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

in EU and abroad

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*

Baraquni L. *PhD program, Bond UniversityAustralia*

FACT FINDING PROTECTING VICTIMS

NEW WEAPONS RESEARCH GROUP

Funding since 2010

Cooperazione internazionale Italiana
Interpal, UK-Gaza
Perdana Fundation, Malaysia
Trauma surgeons, Norwey
NWRG, Italy
Jacobs Fundation
Medicines Belgium
Salaam association, Italy
Surgeons for children, Italy
many individual donors

This «diffuse» sources grant independence

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

Step by step the investigation that document today's message

RESULTS OF RESEARCH

-1-

- IDENTIFICATION OF THE PRESENCE OF HEAVY METALS IN THE ENVIRONMENT POST-WAR AND IN AMMUNITIONS

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

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Heavy metals pulverized from weaponry are found in the environment at weapons “hit sites” in 2006 and 2009.

and in white phosphorus ammunitions used in 2008-09 in Operation Cast lead.

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

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

RESULTS OF RESEARCH - STEP by STEP

-2-

•HEAVY METALS IN WOUND TISSUES WERE "PROOF OF FACT" THAT THEY WERE DELIVERED THERE BY WEAPONS CAUSING WOUNDS WITHOUT FRAGMENTS

Direct proof

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

A

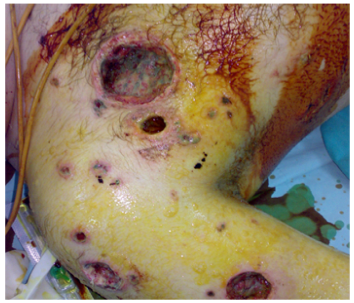
B

C*

D

E

F*



G

H

I*

wounds analyzed from Gaza victims in 2006 and 2009

A,B,C- amputating weapons; D-superficial burns; E,F,I - carbonization; G,H-white -phosphorus burns

FACT FINDING PROTECTING VICTIMS

NEW WEAPONS RESEARCH GROUP

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 burns): Al, Cu, Sr, Ba, Co, Hg, Pb, U, Ti

Simple burns : Co, Hg, Cs, Sn

Skaik S, Abu-Shaban N, Abu-Shaban N, Barbieri M, Barbieri M, Giani U, Manduca P. BMC Int Health Hum Rights. 2010 Jun 25;10:17.

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

RESULTS OF RESEARCH - STEP by STEP

-3-

•CONTAMINATION OF THE POPULATION LASTS IN TIME AFTER ATTACKS

10 months after Cast lead contamination is present in children

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.

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

(*Human contamination by metals was tested according to IAEA in hair of women and newborn*) http://www.newweapons.org/?q=node/112

RESULTS OF RESEARCH - STEP by STEP

-4-

•CORRELATION OF EXPOSURE TO ATTACKS WITH NEGATIVE EVENTS AT BIRTH

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

-was documented an increase in 2010 in the number of infant and children with birth defects admitted in Pediatric Hospitals, compared to 2006.

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.)*	93,76o	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

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Surveillance of reproductive health is the best tool to detect risk from exposure of the population to teratogen (and carcinogen) environmental contamination by heavy metals.

Surveillance is done by reiterating in time the registration at birth

The development of an adequate questionnaire is an essential tool to understand the relationship between circumstances/causes and effects.

To develop a questionnaire requires knowing the life conditions and history of exposures of a population.

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

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

Outcomes of the first registry in 2011:

- Baseline of the incidence of birth defects and prematurity
- Obtaining the 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

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Birth defects in 2011 were associated to mother's exposure to white phosphorus (WP) (p<0.001) and bombing during Cast lead (the exposure was validated through mothers' residence verifing on UNMAT map the sites attacked and the location of weapons retrived)

	Total N	N not exposed	%not exposed	N exposed WP	% exposed WP*	N exposed bombs	%exposed bombs	N exposed WP+bombs	%exposed WP+bombs
NORMAL	2933	2884	98,3	49	1,7	na		na	
Birth Defect	48	19	39,5	12	25	9	18,5	8	16,6

WP= white phosphorus

*p<0.001 for difference for exposed normal and BD

na=not available

--

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

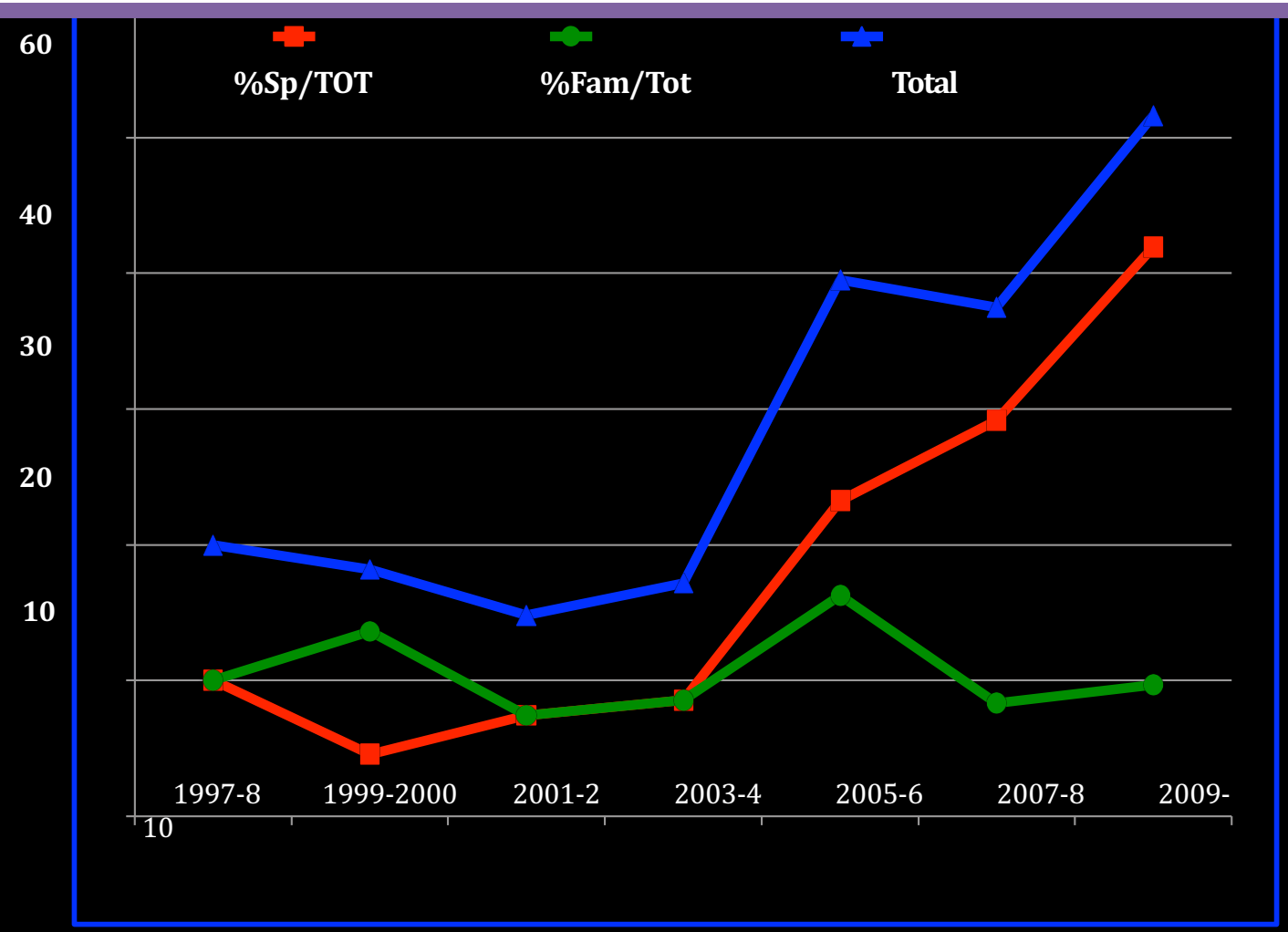
--

-A Naim, et al., Structural birth defects in the Gaza Strip, occupied PalesMnian territory: a cohort study. October 8, 20 12, Lancet

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Birth defects

Significant trend of increase was found for all birth defects and 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

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	0.03(0.02-0.06)	0.05(0.04-0.11)	0.160
Cd	0.03(0.02-0.06)	0.05(0.03-0.09)	0.143
Cr	0.41(0.29-0.59)	0.78(0.38-1.17)	0.053

Data aremedian 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 normalnew borns (12).

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Premature newborn have a different contamination that BD children

Comparison of newborns at term and preterm +low birth weight

Metal	Prematurely born *Gaza 2011 (9)*	Normal Newborn *Gaza 2011 (12)*	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)

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

RESULTS OF RESEARCH - STEP by STEP

-5-

•MOTHER'S EXPOSURE TO ATTACKS IS MOST FREQUENT FOR CHILDREN WITH BIRTH DEFECTS

-6-

•SPECIFIC HEAVY METALS CONTAMINATE IN UTERO NEWBORNS WITH BIRTH DEFECTS OR PRETERM

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

THUS

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.

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

July 16, 2014 -Gaza city beach- second hit

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

8a

Gaza july 2014

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

8b

Gaza july 2014

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

1 & 5

Gaza july 2014

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

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

Thus surveillance was established in parallel with

- In 2015 and 2016 assessment of metal contamination
- In 2015 , 2016, 2017 and 2018 determination of the incidence of reproductive damages

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

RESULTS OF RESEARCH - STEP by STEP

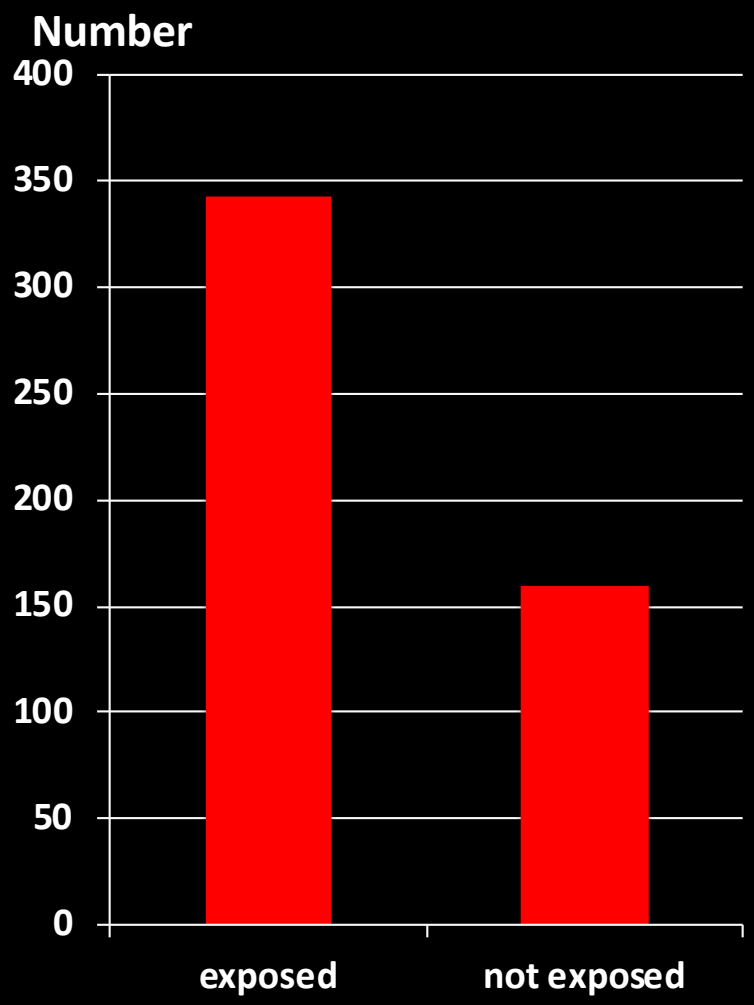
-7-

- HUMAN CONTAMINATION IS HIGHEST IN WOMEN EXPOSED TO ATTACKS IN 2014, COMPARED TO THOSE NOT EXPOSED

- YET, PERSISTANT CONTAMINATION WAS FOUND ALSO FROM PREVIOUS ATTACKS

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

EXPOSURE OF WOMEN TO THE ATTACKS IN 2014



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 Photografically 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.**

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

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	2,599998	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	90,0

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

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 anthropom etric source of heavy metals was found to explain these result.

P. *Manduca, SY. Diab, SR. Qouta, NMA. Albarqouni, RL Punamäki.* *BMJOpen 2017, 7(7):e014035. doi: 10.1136/bmjopen-2016-014035*

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

CONTAMINATION OF MOTHERS BY HEAVY METALS PERSISTS IN 2016- compared to 2015 and to standars

	2015 (Mothers (N=500)				2016			
Metal	95°percentile	95° CI inf	95° CI sup	95°percentile values of reference	95°percentile	95° CI inf	95° CI sup	Number
Ba	29,69	24,04	49,18	<4,64	43,24	7,4	13,7	71
Cd	0,24	0,2	0,3	<0,2	0,67	0,16	0,25	73
Co	0,57	0,37	0,76	0,01-0,30	2,57	0,17	0,71	69
Mo	0,26	0,21	0,32	0,03-1,00	0,23	0,05	0,08	73
Se	0,88	0,86	0,95	0,40-1,70	0,67	0,2	0,93	52
Sr	136	122,39	160,26	0,65-6,90	202	51,1	80,5	73
Ti	0,82	0,73	1	<1,50	1,98	0,53	0,8	71
U	0,53	0,46	0,68	<0,10	0,45	0,13	0,19	71
V	1,4	1,26	1,56	0,01-0,20	1,77	0,67	1,07	72

The metal contamination persisted in women in 2016 at similar high levels as in 2015

Manduca P et al. Reproductive Toxicology, 2019, 86:23-32

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

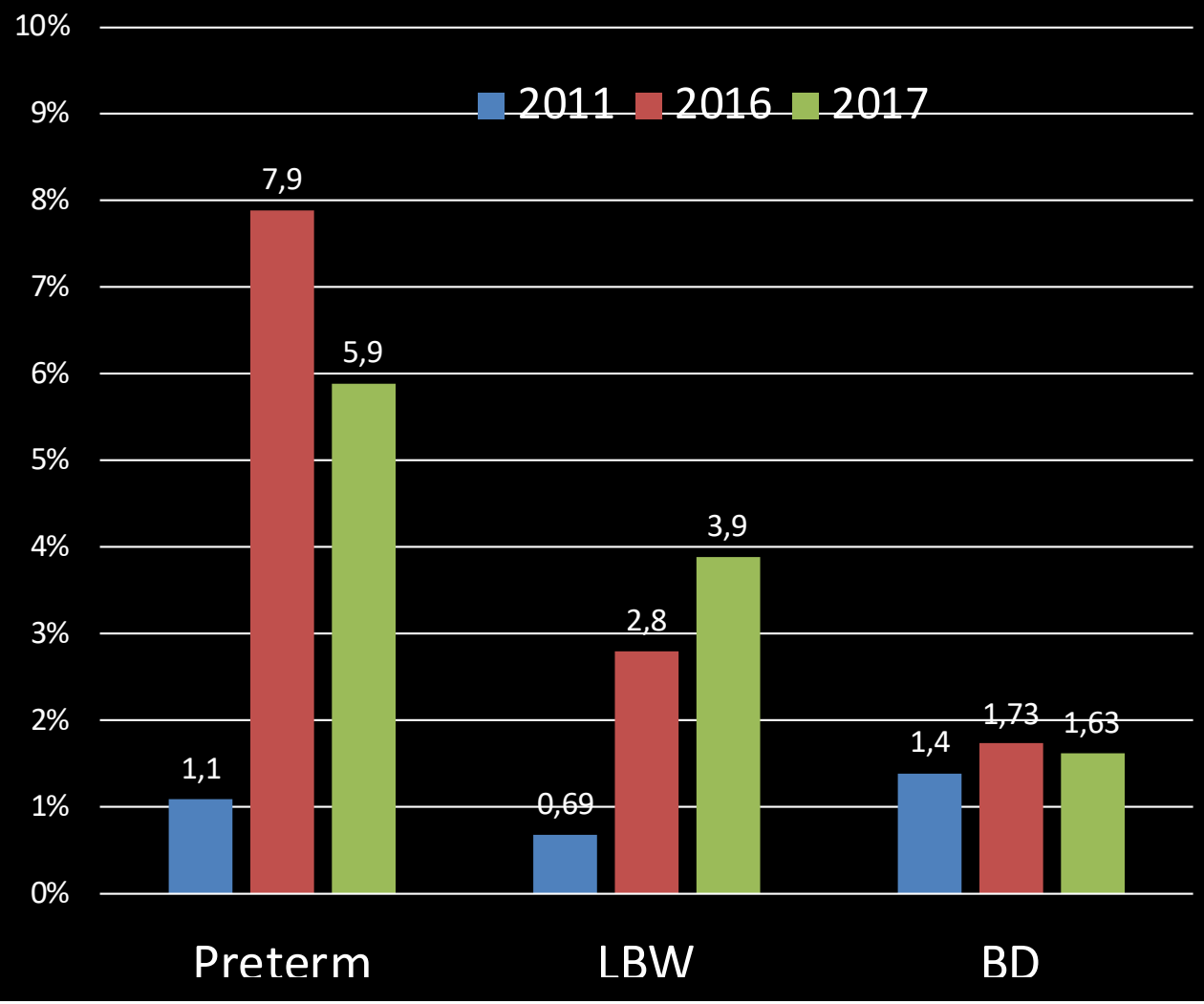
Health at birth from 2011 to 2016

The end point for health shown for 2011, 2016 and 2017 is the incidence of major birth defects and prematurity

RESULTS OF RESEARCH - STEP by STEP

-8-

- INCREASE IN PRETERM Low BirthWeight AND BIRTH DEFECT BABIES IN TIME FROM 2011 TO 2017



RESULTS OF RESEARCH - STEP by STEP

-9-

IN 2016 WERE IDENTIFIED NOVEL ENVIRONMENTAL FACTORS ASSOCIATED WITH NEGATIVE OUTCOME AT BIRTH

Summary of predictive associations with negative outcomes at birth						
	preterm		low birth weigth		**birth defect**	
previous miscarriage	NO		NO		**NO**	
primiparity	NO		NO		**NO**	
consanguineity	NO		YES	**2017**	**YES**	**2011**
no use of folic acid	YES	2016&2(	NO		**NO**	
previous birth defect	NO		NO		**YES**	**2016**
this baby BD	YES	2016&2(	NO		**/**	
this baby less 2,5 kg	YES	2016&2(	/		**NO**	
this baby preterm	/		YES	**2016&2017**	**NO**	
mother's over 36Y	NO		NO		**NO**	
mother's under 18Y	NO		NO		**NO**	
IVF	NO		NO		**NO**	
multiple conception	NO		YES	**2016&2017**	**YES**	**2017**
anemia	yes	2017	NO		**NO**	
diabetes	yes	2016				
hypertension	yes	2016				
poor diet	YES	2016	YES	**2016&2017**	**NO**	
mother low schooling	NO		YES	**2017**	**NO**	
mother work outside home	NO		NO		**yes**	**2016**
mother war-related exposures (4)	NO		NO		**NO**	
industry	NO		yes	**2016**	**NO**	
household/land chemicals (4)	NO		NO		**NO**	
open sewage	NO		NO		**YES**	**2016**
nearness to garbage	YES	2016	NO		**NO**	
nearness sewage plant	NO		YES	**2016**	**NO**	
nearness to sewage and garbage	YES	2016	NO		**YES**	**2016**
YES- predictive known						
YES- predictive- novel						
yes - preditive low relaibility (low numbers), needs confirmation						

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Residence near open sewage or burning garbage is associated both with highest load for some metals and with higher frequency of birth defects and preterm born babies in 2016

		median	average	n	p
Ba	near	7,79	30,6764	25	0,01452 *
	not	4,23	4,964	21	
As	near	0,054	1,45156	25	0,6477
	not	0,062	0,1278	21	
Cd	near	0,187	0,277548	25	0,1231
	not	0,131	0,161075	21	
Co	near	0,14	0,925	25	0,01372 *
	not	0,11	0,242857143	21	
Hg	near	0,297	1,576876	25	0,05795 *
	not	0,159	0,20883	21	
Mo	near	0,044	0,07444	25	0,3546
	not	0,064	0,07235	21	
Se	near	0,47	0,8865	25	0,2431
	not	0,41	0,368666667	21	
Ti	near	0,52	0,9168	25	0,3729
	not	0,63	0,697222222	21	
U	near	0,15	0,183772	25	0,226
	not	0,123	0,140095	21	
V	near	0,908	1,1472	25	0,01362 *
	not	0,61	0,548	21	

-P. Manduca,et al. Reproductive Toxicology, 2019 https://doi.org/10.1016/j.reprotox.2019.02.003

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

HIDDEN VICTIMS CAN NOW BE COUNTED

PRETEM 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 AND 2017 AN ADDITIONAL TOLL OF ABOUT 1500 PERINATAL DEATHS/ YEAR

THIS ARE NUMBERs HIGHER THAN THOSE OF CHILDREN KILLED DIRECTLY IN THE 2014 WAR

WE DO NOT KNOW YET IF THIS LOSS OF NEWBORNS WILL CONTINUE TO INCREASE, WILL STABILIZE OR DECREASE IN TIME.

IN SUMMARY

-IT IS DOCUMENTED THE PERSISTENCE FOR YEARS IN GAZA OF HUMAN CONTAMINATION BY HEAVY METALS WAR-REMNANTS IN THE ENVIRONMENT- EACH NEW ROUND OF ATTACKS INCREASES THIS CONTAMINATION.

-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, THE TOLL CAN BE MEASURED AND NUMBER OF VICTIMS EXCEEDS THOSE BY DIRECT ATTACKS.

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 elephant and bird 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

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

GENERAL METHODOLOGICAL ISSUES for this kind of studies

ADEQUACY OF QUESTIONNAIRES (DEVELOPED AD HOC and renewed in time)- VERY RELEVANT

RELIABILITY OF DATA ACQUISITION - PROSPECTIVE STUDIES ARE NEEDED

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

BUILDING CONDITIONS FOR LONGITUDINAL STUDIES

DEVELOPING TOOLS FOR THE INTERPRETATION OF DATA

TRANSPARENCE IN AIMS and BUILDING OF TRUST

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

OUTCOME DOCUMENTATION

- -Paola Manduca, Nabil Al Baraquni, Loai Albarqouni, Dania Abu Abadi, Hanady Abdallah, Ghada Abu Hamad, Taghreed Abu Mosa, Suha Balousha, Huda Miqdad, https://www.bmj.com/content/349/bmj.g6644/rr-1 Wafa Mohammed, Maha Salah, Raneem El Shawwa. Hospital centered surveillance of births in Gaza, Palestine, 2011-2017 and heavy metal contamination of the mothers reveal long term impact of wars. Reproductive Toxicology, 2019. https://doi.org/10.1016/j.reprotox.2019.02.003

- -MerviVänskä[a] Safwat Y.Diab[b]KaisaPerko[a]Samir R.Quota[c]Nabil M.A.Albarqouni[c]AnnaMyöhänen[a]Raija-LeenaPunamäki[a]PaolaManduca[d] Toxic Environment of War: Maternal Prenatal Heavy Metal Load Predicts Infant Emotional Development. Infant Behavior and Development. Volume 55, May 2019, 1-9 https://doi.org/10.1016/j.infbeh.2019.01.002

- -D Summerfield, Vittorio Agnoletto, Swee Ang, Andrea Balduzzi, Franco Camandona, David Halpin, Ghada Karmi, Paola Manduca, Marina Rui, Gianni Tognoni, Guido Veronese Fuel and Gazan hospitals: Israeli siege and the politics of permanent emergency BMJ 31 January 2019

- -P. Manduca, SY. Diab, SR. Qouta, NMA. Albarqouni, RL Punamäki 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 in press 2017

- -Y. Abed, N.Al Barqouni, A. Naim and P.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 4, 2319-23, 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.

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

- -Manduca P.-Past emerging from present recording: reproductive health history reveals increase in prevalence of birth defects over time, in Gaza, Palestine LPHA 2013, Lancet oral presentation, Epublished 2014

- -Manduca P. We are both doctors: a Palestinian doctor writes to an Israeli colleague- Starting from rubble: Collateral victims not accounted for? Long term health effects of the last war of Israel on next generation of Gaza people *BMJ* 2014; 349 doi: http://dx.doi.org/10.1136/bmj.g5106

- -Manduca P, Chalmers I, Summerfield D, Gilbert M, Ang S. and 20 Authors 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.

- -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, 9(5), 1732-1747

- -Naim A, Al Dalies H, El Balawi M, Salem E, Al Meziny K, Al Shawwa R, Minutolo R, Manduca P. Birth defects in Gaza: a cohort study. Lancet Palestinina Health Alliance, Special Issue October 2012

- -Alaani S, Savabieasfahani M, Tafash M, Manduca P. Four polygamous families with congenital birth defects from Fallujah, Iraq. Int J Environ Res Public Health. 2011 Jan;8(1):89-96. Epub 2010 Dec 31.

- -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 Jun 25;10:17.

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. 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.

-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.

Summerfield D. et al 2019, Fuel and Gazan hospitals: the politics of permanent emergency, https://www.bmj.com/content/349/bmj.g6644/rr-1

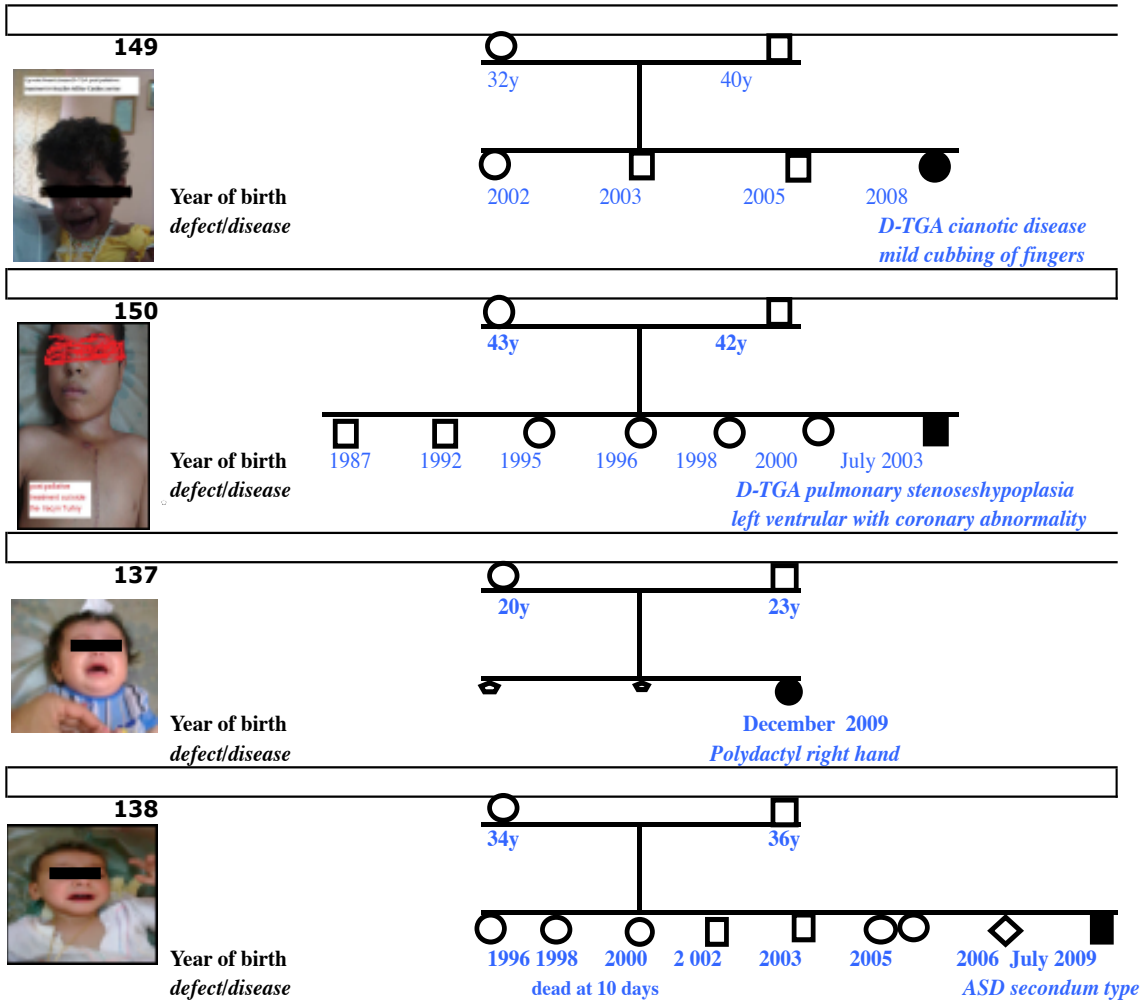
PUBLISHED ON LINE
-Manduca Barbieri M, BarbieriGaza Strip, soil has been contaminated due to bombings: population in danger. http://www.newweapons.org/?q=node/110#attachments, January 2010

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

Short Iraq chapter 2009-10

The work was suspended due to «external» interferences

Example of pedigree collected in 2010 for 56 families with birt defects

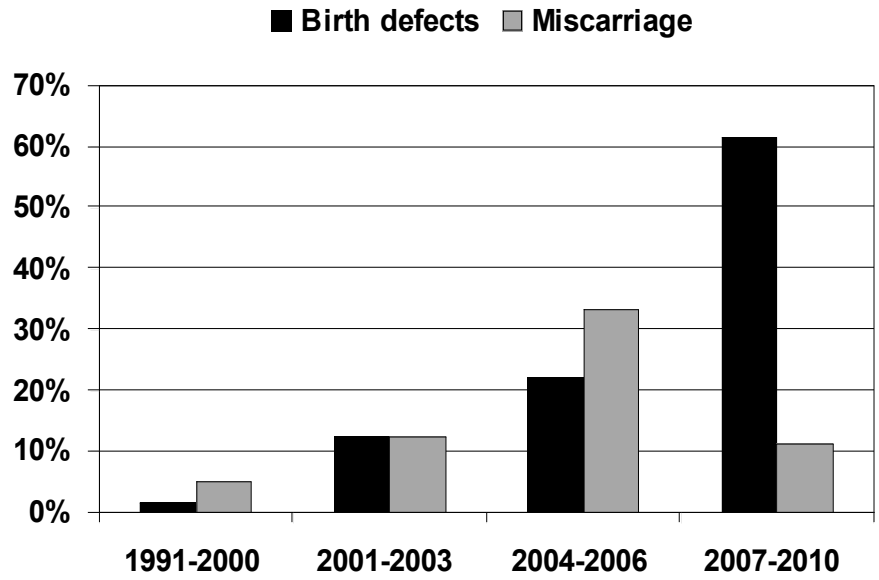


- Data collected by dr S.Alaani and dr M. Tafash, Falujiah, Iraq in 2009/2010

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Figure 2

A B C D



Change in prevalence in time of birth defects and miscarriages

- Four polygamous families with congenital birth defects from Fallujah, Iraq. *Alaani S, Savabieasfahani M, Tafash M, Manduca P. Int J Environ Res Public Health. 2011*

Study of the contaminants in hair of mothers fathers and babies were not published in scientific paper but only on line http://www.newweapons.org/?q=node/120

Comparison of metal load in women in Fallujah in 2010 with standards from outside war areas shows association between exposure to past attacks and level of metal contamination, in the context of stable residentiality of the families since 2014

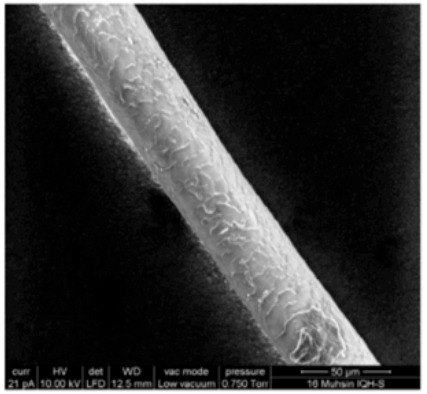
95 percentile only mothers	ppm											
exposed anytime to	V	Cr	Co	As	Sr	Cd	Ba	W	Hg	Pb	U	Mo
Bombing (N=21)	5,3	5,2	2,5	5,8	132	2,3	154	2,14	24,4	24	2,3	2,3
Bombing and white phosphorus (N=9)	1	1,4	0,54	0,25	26,7	0,2	12,7	0,17	6,1	12,5	0,97	0,173
Reported no exposure (N=11)	0,65	0,68	0,2	0,33	37,9	0,065	4,2	0,077	2,5	32,5	0,235	0,26
standards from not war zone (N=500)	*0,2*	*0,21*	*0,3*	*<0,2*	*6,9*	*<0,2*	*<4,6*	*<0,2*	*<0,6*	*<3*	*<0,1*	*1*
95th perc. higher than standards europe	highes	mediur	lowest	no diff								

Chemical analysis by Barbieri, data elaboration by Manduca, unpublished

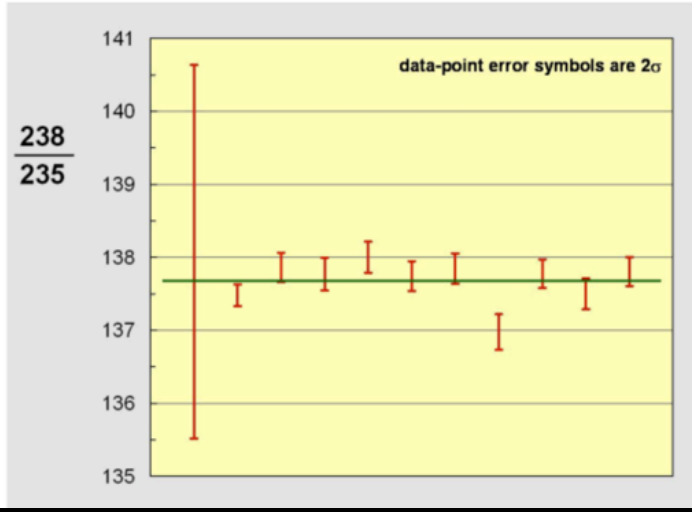
FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

Uranium isotope ratio in the hair of families with BD child							
sample	238U ppb	2 SD	235/238	2 SD	236/238	238/235	2 SD
*155C**	6.07	0.18	0.007242	0.000134	<0.000001	138.08	2.56
155F	200	6	0.007274	0.000008	<0.000001	137.48	0.30
155M	112	3.4	0.007254	0.000011	<0.000001	137.86	0.40
*153C**	32	1	0.007259	0.000012	<0.000001	137.77	0.44
153F	88.6	2.7	0.007246	0.000011	<0.000001	138.00	0.42
153M	65.5	1.9	0.007260	0.000011	<0.000001	137.74	0.40
110 C°	66	1.9	0.007254	0.000011	<0.000001	137.85	0.42
110F	39.5	1.2	0.007300	0.000013	<0.000001	136.98	0.48
110M	251	7.5	0.007258	0.000010	<0.000001	137.78	0.40
104F	177	5.3	0.007273	0.000011	<0.000001	137.50	0.42
*104C**	290	8.8	0.007257	0.000010	<0.000001	137.80	0.40

B



C



A- Numbers on the left identify the family, and letters are, C = child, M= mother, F= father
ppb= parts per bilion in weigth of sample. * newborn child, °infant
2SD, two standard deviations of the measurement taking all identifiable contributions into account for the uncertainty; no 236U was detected in any of these samples above the detection limit which is approximately 20 counts per second as measured on the electron multiplier for mass 236, corresponding to a ratio of 236/238 of <0.000 001. .
Blanks were measured at 5±3 picograms of U for the procedure.

B- Hair as seen by SEM after cleaning and ready for analysis

C- Diagram of results; the green line is the mean, here overlapping the natural U value of 137.8.

The natural composition of uranium is 137.8 and taking into account the uncertainties of all the measurements, essentially all hair samples are consistent with their having only natural uranium. Analysis at NRCK, courtesy prof Randal- *unpublished*

IN ADDITION TO THEIR NEGATIVE EFFECTS ON BIRTH OUTCOMES:

HEAVY METALS CAN INDUCE TUMORS, MALE INFERTILITY AND CHRONIC DISEASES (NCD)

The hidden toll of tumors, NCD and male infertility has not yet been studied in afterwar contexts

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

No scientific studies have been conducted systematically yet anywhere else than Gaza

We have focused on exstablishing levels of contamination by heavy metals in mothers, proving the passage in utero to the baby and the association of mothers level of contamination with weapon exposure and negative outcome of birth.

and that was GOOD to learn

because it was not proved before and it can help to remediate or prevent the occurrence of negative outcomes in babies and any eventual effect on infant development during breast feeding and afterwards.

FACT FINDING
PROTECTING VICTIMS
NEW WEAPONS
RESEARCH GROUP

but this knowledge is not exhaustive

there is a lot we do not jet know and can help towards defining the extent of the damages to healht of the population as a whole and the potential of remediation of the damages

e.g.

-for how long the risk will persist?

-what is the effect of different levels of multiple metal contaminants and how these metal interact in the body?

-what is that each metal impair/interferes with and by which molecular mechanisms?

and also

-is any specific birth defect associated to one of these metals or with a specific combination of them?

-is infant exposed in utero also affected in development?(issues posed by an environment persistantly contaminated)

-is there also an effect of metal contamination on the prevalence of cancers and other not comunicable diseases?

Reminder

These are studies that require time and different competences, clinical, genetic, environmental, analytical, statistic and which can be grouped only when a substantial glue, that is reciprocal TRUST is present between the collaborating parties.

In addition, in general, the “context” is indifferent or against the obtainment of such kind of knowledge and its publication.

Knowledge progresses slowly because of

1-Intrinsic reasons:

-Very difficult regional settings make difficult to design investigations that achieves significant documentation

-Costly analysis and labour intensive protocols

-Requires collaboration of various professional competences in medical, science, environmental fields

2-External reasons:

-This knowledge is not encouraged for political reasons, and this sometimes creates conditions dangerous for the researchers.

- Reluctance of WHO to take up its stated SDG in afterwar settings

RECCOMENDED ACTIONS IN "AFTER WAR" REGIONS

→Surveillance at birth as first and most informative presidium for health. It is also not costly.
MUST BE EXTENDED AND CONTINUED IN TIME.
MUST INCLUDE APPROPRIATE STUDY OF ENVIRONMENTAL EVENTS, THEIR CHRONOLOGY AND OF LOCAL SETTINGS.

→Human contamination could be targeted with remedies and babies lives preserved. STUDIES AND TRIALS COULD BE DESIGNED IN THE CASES WHEN MAJOR CONTAMINANTS ASSOCIATED TO BIRTH DEFECTS AND PRETERM BIRTHS ARE IDENTIFIED

→Longitudinal studies on infant/child health and development .are needed and COULD START ON THE BABIES REGISTRERED AT BIRTH.

FACT FINDING PROTECTING VICTIMS
NEW WEAPONS RESEARCH GROUP

The arm of law: the struggle for health advances through knowledge and request for justice, and forwards by action of the populations involved.

thanks

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