The environmental and social factors of maternal/child health - What are the most critical issues to be tackled in Taiwan?

PAO-LIN KUO
OG/GYN DEPARTMENT, NATIONAL CHENG-KUNG UNIVERSITY COLLEGE OF MEDICINE

Agenda

- The mission of maternal-child health research
- The environmental and social factors of maternal-child health
- Fertility, sterility and fertility rate
- What we ought to do

Maternal-child health research – The mission and strategy

- ***Mission:***
  Promote social well-being by improving maternal-child health
- ***Strategy:***
  (1) Propose an integrated approach to improve fertility and maternal-child health.
  (2) Provide evidence to arouse social consciousness and to help shaping policy.

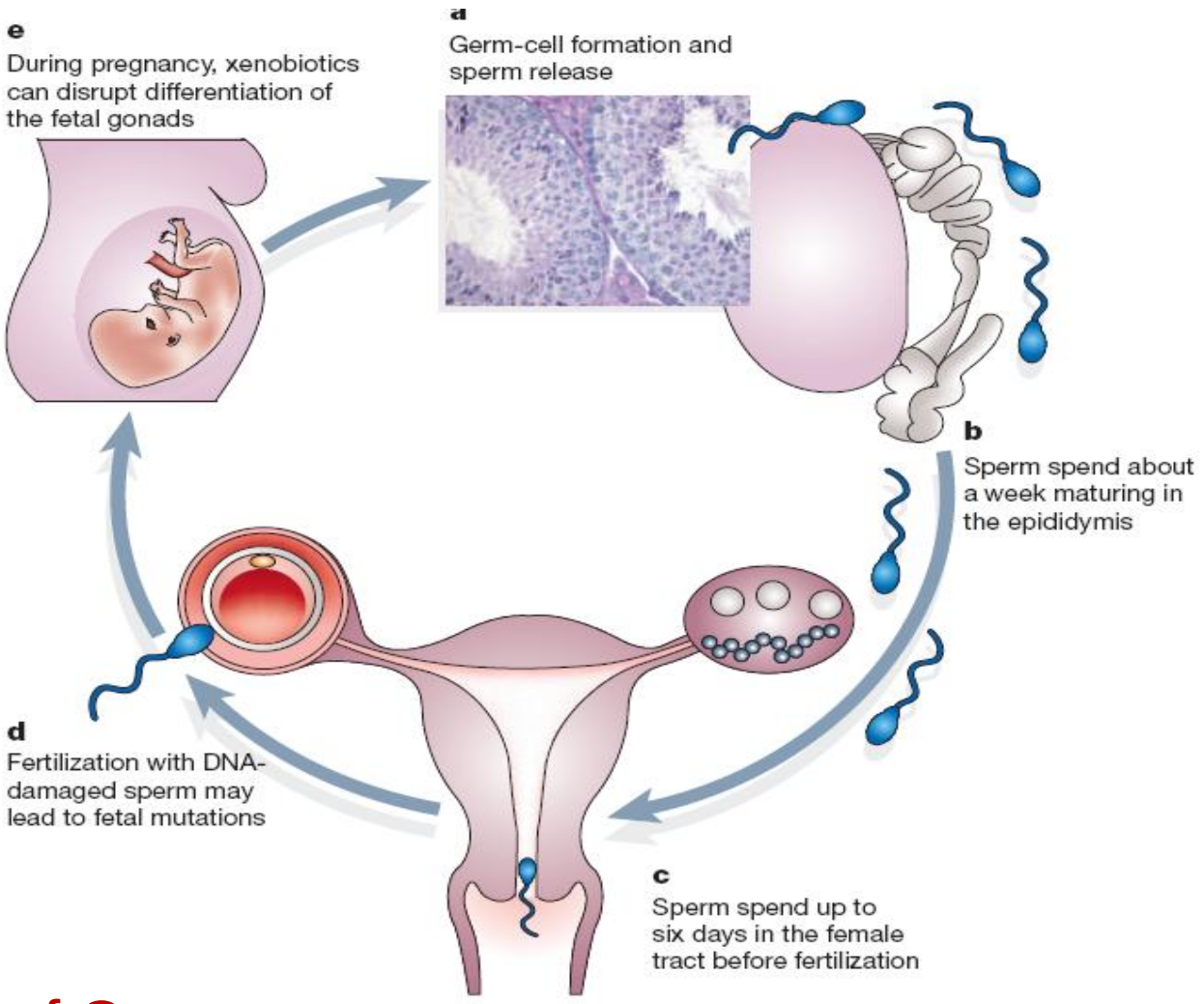
Major problems

- Infertility (sub-fertility)
- Pregnancy complications as well as high-risk infants
- Congenital anomalies, genetic syndromes, developmental delay/intellectual deficit
- Allergic disease and immune dysfunctions
- Mental health

Prenatal , perinatal, postnatal factors all contribute to all of these problems.

Developmental origin of health and disease (DOHaD) hypothesis

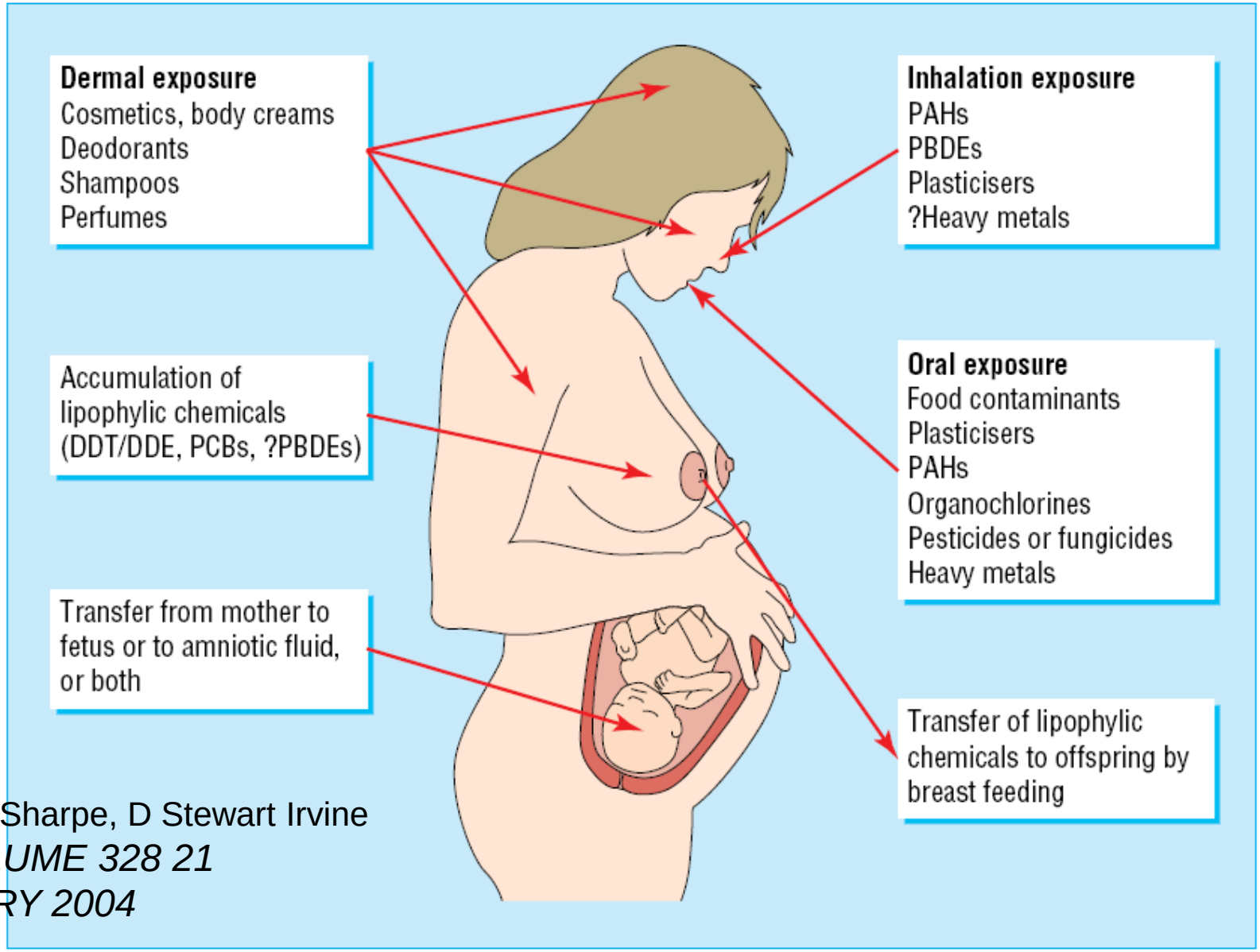
- Early life exposures can influence disease outcomes throughout the entire lifespan of an organism
- **Examples:**
  (1) Obesity and metabolic syndrome
  (2) Precocious puberty, infertility and reproductive failures
  (3) Allergic diseases
  (4) Mental health and neurobehavioral problems
  (5) Endocrine-related tumors
  (6) Cardiovascular disease (and others)



Seeds of Concern

During the past few decades, worries about environmental threats to human health have centered on the possible induction of cancers. Now risks to the male germ line, both real and potential, are also causing disquiet.

Nature 2004;432:48



Richard M Sharpe, D Stewart Irvine
BMJ *VOLUME 328 21*
FEBRUARY 2004

Routes of human exposure to some common environmental chemicals.
DDE=1,1-dichloro-2, 2-bis(p-chlorophenyl)ethylene, DDT=dichlorodiphenyltrichloroethane, PAHs=polycyclic aromatic hydrocarbons, PCBs=polychlorinated biphenyls

Support mothers to secure future public health

Evidence that long-term health is shaped by the environment in early life calls for prenatal interventions to tackle chronic disease, argue **David Barker** and colleagues.

Nature Magazine, 2 0 1 3;5 0 4 :2 1 1

Contaminants of emerging concern (CEC) have been linked to

- Allergy (asthma, atopic dermatitis, allergic rhinitis)
- Gonad: poor semen quality, premature menopause, poor quality of oocyte (embryo), failed implantation
- Sexual development: precocious puberty, hypospadia, cryptochidism, micropenis
- Metabolism: obesity, type II DM, PCOD
- Endocrine-related tumors: breast cancer, endometrial cancer; endometriosis, uterine leiomyoma, adenomyosis

Other possible links

- Recurrent miscarriage
- Preterm labor, preeclampsia, gestational DM
- Fetal growth restriction
- Abnormal behavior and learning problems (including ASD, ADHD)
- Thyroid dysfunction
- Autoimmune dysfunction

Some well known environmental contaminants in Taiwan

- PCB
- Dioxin
- Phthalate
- Nonylphenol
- Heavy metals
- Fine particles

Are there neglected contaminants?

Sources

- Ambient air
- Food
- Water
- Occupation and others
- *Stress (too complicated to be address?)*
- *Poverty (too complicated to be address?)*

Ambient air (air pollution)

Environmental Health Perspective 2014

News | Science Selections

Disease Burdens Associated with $PM_{2.5}$ Exposure

How a New Model Provided Global Estimates

Like traffic jams and cell phones, particulate air pollution is a reality of modern living. Whether it's from cigarette smoking, industrial emissions, or the burning of wood and dung for fuel, fine particulate matter ($PM_{2.5}$) has been strongly linked to cardiovascular disease, inflammation, lung cancer, and other lung diseases.[1,2] As part of the Global Burden of Disease Study (GBD) 2010 collaboration,[3] an international

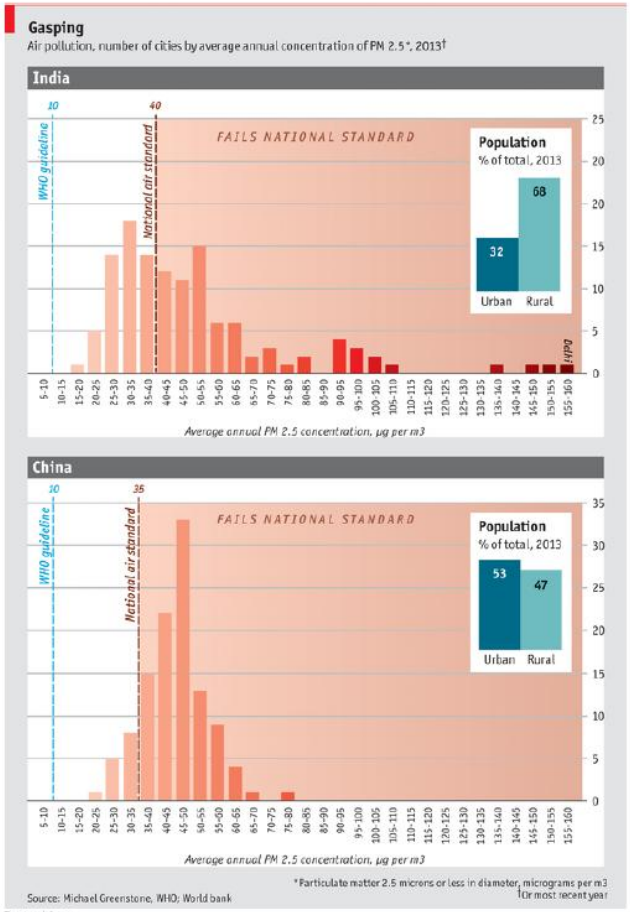
The GBD 2010 team incorporated information about the health risks of $PM_{2.5}$ from ambient air pollution, active smoking, secondhand smoke, and indoor burning of solid fuels into an integrated exposure–response model. Clockwise from upper right: © Zirafek/IStockphoto; © David Young-Wolff/Getty; © Crispin Hughes/Panos; © Mac99/IStockphoto

The Economist 2016

India v China

Airpocalypse

Feb 6th 2015, 13:14 BY A.R. AND THE DATA TEAM



LETTER

Nature Magazine 2015

doi:10.1038/nature15371

The contribution of outdoor air pollution sources to premature mortality on a global scale

J. Lelieveld[1,2], J. S. Evans[3,4], M. Fnais[5], D. Giannadaki[2] & A. Pozzer[1]

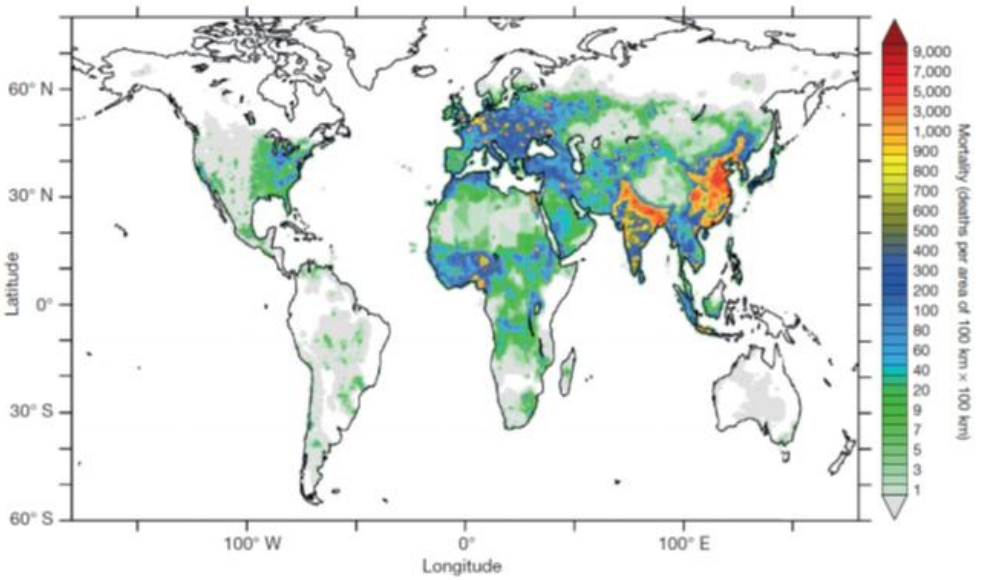


Figure 1 | Mortality linked to outdoor air pollution in 2010. Units of mortality, deaths per area of 100 km × 100 km (colour coded). In the white areas, annual mean $PM_{2.5}$ and O_3 are below the concentration–response thresholds where no excess mortality is expected.

Air pollution has been linked to

- Preterm labor
- Stillbirth
- Birth defect
- Fetal growth restriction
- Neurobehavioral development
- Allergic disease

Contents lists available at ScienceDirect

International Journal of Pediatric Otorhinolaryngology

journal homepage: www.elsevier.com/locate/ijporl

2009

Prenatal risk factors and occurrence of allergic rhinitis among elementary school children in an urban city

Szu-Pin Hsu [a], Kai-Nan Lin [b], Ching-Ting Tan [b], Fei-Peng Lee [c], Hung-Meng Huang [a,*]

EPIDEMIOLOGY

BJD
British Journal of Dermatology

2015

Prenatal air pollutant exposure and occurrence of atopic dermatitis*

C.C. Huang,[1,2] H.J. Wen,[3] P.C. Chen,[1,2] T.L. Chiang,[4] S.J. Lin[5] and Y.L. Guo[1,2]

Int. J. Environ. Res. Public Health **2014**, *11*, 6827-6841; doi:10.3390/ijerph110706827

OPEN ACCESS

International Journal of
Environmental Research and Public Health
ISSN 1660-4601
www.mdpi.com/journal/ijerph

2014

Article

Multilevel Analysis of Air Pollution and Early Childhood Neurobehavioral Development

Ching-Chun Lin [1], Shih-Kuan Yang [1], Kuan-Chia Lin [2], Wen-Chao Ho [3], Wu-Shiun Hsieh [4], Bih-Ching Shu [5] and Pau-Chung Chen [1,6,7,*]

Air Pollution and Stillbirth: A Population-Based Case–Control Study in Taiwan

EHP 2011

Bing-Fang Hwang,[1] Yungling Leo Lee,[2] and Jouni J.K. Jaakkola[3,4]

[1]Department of Occupational Safety and Health, College of Public Health, China Medical University, Taichung, Taiwan; [2]Institute of Epidemiology and Preventive Medicine and Research Center for Genes, Environment and Human Health, College of Public Health, National Taiwan University, Taipei, Taiwan; [3]Center for Environmental and Respiratory Health Research, Institute of Health Sciences, University of Oulu, Oulu, Finland; [4]Institute of Occupational and Environmental Medicine, University of Birmingham, Birmingham, United Kingdom

American Journal of Epidemiology

Vol. 181, No. 4
DOI: 10.1093/aje/kwu264
Advance Access publication:
February 3, 2015

Original Contribution

Associations Between Ozone and Preterm Birth in Women Who Develop Gestational Diabetes

2015

Yu-Ting Lin, Chau-Ren Jung, Yungling Leo Lee, and Bing-Fang Hwang*

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

2017

Association of temporal distribution of fine particulate matter with glucose homeostasis during pregnancy in women of Chiayi City, Taiwan

Mei-Chun Lu[a], Panchalli Wang[b], Tsun-Jen Cheng[c,d], Chun-Pai Yang[a,e,f], Yuan-Horng Yan[a,c,f,g,*]

Food and Water

Yucheng Incident

Growth Abnormalities in the Population Exposed *in Utero* and Early Postnatally to Polychlorinated Biphenyls and Dibenzofurans

EHP 1995

Yueliang L. Guo,[1] George H. Lambert,[2] and Chen-Chin Hsu[3]

[1]Department of Occupational and Environmental Health, National Cheng Kung University Medical College, Tainan, Taiwan; [2]Department of Pediatrics, UMDNJ-Robert Wood Johnson Medical School, New Brunswick, New Jersey; and [3]Department of Psychiatry, National Cheng Kung University Medical College, Tainan, Taiwan

EHP 2005

In Utero Exposure to Dioxins and Polychlorinated Biphenyls and Its Relations to Thyroid Function and Growth Hormone in Newborns

Shu-Li Wang,[1] Pen-Hua Su,[2] Shiang-Bin Jong,[3] Yueliang L. Guo,[4] Wei-Ling Chou,[1] and Olaf Päpke[5]

EHP 2008

Exposure to a Mixture of Polychlorinated Biphenyls and Polychlorinated Dibenzofurans Resulted in a Prolonged Time to Pregnancy in Women

Chiu-Yueh Yang,[1,2] Ying-Jan Wang,[3] Pau-Chung Chen,[4] Shaw-Jenq Tsai,[1,5] and Yueliang Leon Guo[4,6]

Chemosphere 165 (2016) 294–297

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

2016

Polychlorinated biphenyls and dibenzofurans increased abnormal sperm morphology without alterations in aneuploidy: The Yucheng study

Ping-Chi Hsu [a, 1], Ming-Chieh Li [b, c, 1], Yeu-Chin Lee [d], Pao-Lin Kuo [e], Yueliang Leon Guo [b, c, f, *]

2013

Plasticizer-tainted food incident

Food and Chemical Toxicology 58 (2013) 362–368

Contents lists available at SciVerse ScienceDirect

Food and Chemical Toxicology

journal homepage: www.elsevier.com/locate/foodchemtox

Taiwan food scandal: The illegal use of phthalates as a clouding agent and their contribution to maternal exposure

Justin Yang [a], Russ Hauser [a,b], Rose Hannah Goldman [a,b,c,d,*]

JOURNAL OF FOOD AND DRUG ANALYSIS 21 (2013) 242–246

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.jfda-online.com

Case Report

A review on the response and management of the plasticizer-tainted food incident in Taiwan

Yu-Hsuan Chen [a,], Shu-Ching Fu [a], Jhih-Kai Huang [a], Hwei-Fang Cheng [a], Jaw-Jou Kang [b]*

Phthalate and women's diseases

Human Reproduction, Vol.25, No.4 pp. 986–994, 2010
Advanced Access publication on February 10, 2010 doi:10.1093/humrep/deq015

human reproduction ORIGINAL ARTICLE *Reproductive biology*

2010

Association between phthalate exposure and glutathione *S*-transferase M1 polymorphism in adenomyosis, leiomyoma and endometriosis

Po-Chin Huang[1], Eing-Mei Tsai[2,5], Wan-Fen Li[1], Pao-Chi Liao[3], Meng-Chu Chung[1], Ya-Hui Wang[1], and Shu-Li Wang[1,4,5,*]

Environ Sci Pollut Res (2014) 21:13964–13973
DOI 10.1007/s11356-014-3260-6

RESEARCH ARTICLE

2014

Risk for estrogen-dependent diseases in relation to phthalate exposure and polymorphisms of *CYP17A1* and estrogen receptor genes

Po-Chin Huang · Wan-Fen Li · Pao-Chi Liao · Chien-Wen Sun · Eing-Mei Tsai · Shu-Li Wang

www.impactjournals.com/oncotarget/ Oncotarget, Vol. 7, No. 20

2016

Benzyl butyl phthalate promotes breast cancer stem cell expansion via SPHK1/S1P/S1PR3 signaling

Yu-Chih Wang[1,*], Cheng-Fang Tsai[2,*], Hsiao-Li Chuang[3], Yi-Chih Chang[4], Hung-Sheng Chen[2], Jau-Nan Lee[1], Eing-Mei Tsai[1,2]

Phthalate and Male Infertility

Int Arch Occup Environ Health
DOI 10.1007/s00420-013-0905-6

ORIGINAL ARTICLE

2013

Urinary metabolites of di(2-ethylhexyl) phthalate relation to sperm motility, reactive oxygen species generation, and apoptosis in polyvinyl chloride workers

Li-Ping Huang · Ching-Chang Lee · Jer-Pei Fan · Po-Hsiu Kuo · Tung-Sheng Shih · Ping-Chi Hsu

Fertil Steril 2011;96:90–4

The association between semen quality in workers and the concentration of di(2-ethylhexyl) phthalate in polyvinyl chloride pellet plant air

Li-Ping Huang, M.S.,[a,b] *Ching-Chang Lee, Ph.D.,*[c] *Ping-Chi Hsu, Ph.D.,*[a] *and Tung-Sheng Shih, Sc.D.*[d,e]

Human Reproduction, Vol.30, No.11 pp. 2658–2670, 2015
Advanced Access publication on September 18, 2015 doi:10.1093/humrep/dev225

human reproduction

ORIGINAL ARTICLE *Reproductive epidemiology*

Phthalates might interfere with testicular function by reducing testosterone and insulin-like factor 3 levels

2015

Wei-Hsiang Chang[1], Sih-Syuan Li[1], Meng-Hsing Wu[2], Hsien-An Pan[3], and Ching-Chang Lee[1,4,*]

Phthalate and Puberty

Human Reproduction, Vol.28, No.10 pp. 2765–2773, 2013
Advanced Access publication on August 14, 2013 doi:10.1093/humrep/det325

human reproduction

ORIGINAL ARTICLE *Puberty, aging and HRT*

Phthalates may promote female puberty by increasing kisspeptin activity

Chung-Yu Chen[1], Yen-Yin Chou[2], Yu-Min Wu[1], Chan-Chau Lin[1], Shio-Jean Lin[2], and Ching-Chang Lee[1,3,*]

2013

Environmental Research 136 (2015) 324–330

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

2015

Prenatal exposure to phthalate ester and pubertal development in a birth cohort in central Taiwan: A 12-year follow-up study

Pen-Hua Su[a,b,1], Chin-Kuo Chang[c,1], Ching-Yi Lin[d,e], Hsiao-Yen Chen[f], Pao-Chi Liao[g], Chao A. Hsiung[k], Hung-Che Chiang[h], Shu-Li Wang[f,i,j,*]

Environmental Research 149 (2016) 197–205

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

Effects of high di(2-ethylhexyl) phthalate (DEHP) exposure due to tainted food intake on pre-pubertal growth characteristics in a Taiwanese population

2016

Yen-An Tsai[a], Ching-Ling Lin[b,c], Jia-Woei Hou[c,d], Po-Chin Huang[e], Meng-Chih Lee[f], Bai-Hsiun Chen[g,h], Ming-Tsang Wu[i,j,k,l], Chu-Chih Chen[m], Shu-Li Wang[n], Ching-Chang Lee[o,p], Chao Agnes Hsiung[q,*], Mei-Lien Chen[a,**], RAPIT Group[1]

Phthalate and childhood development

Chemosphere 82 (2011) 947–955

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

2011

Phthalate exposure in pregnant women and their children in central Taiwan

Susana Lin[a], Hsiu-Ying Ku[b], Pen-Hua Su[c,d], Jein-Wen Chen[a], Po-Chin Huang[a], Jürgen Angerer[e], Shu-Li Wang[a,f,*]

OPEN ACCESS Freely available online

PLOS ONE

2014

Sex Steroid Hormone Levels and Reproductive Development of Eight-Year-Old Children following *In Utero* and Environmental Exposure to Phthalates

Pen-Hua Su[1,2,3], Jia-Yuh Chen[1,2], Ching-Yi Lin[4,5], Hsiao-Yen Chen[3], Pao-Chi Liao[6,7], Tsung-Ho Ying[4,5], Shu-Li Wang[3,8]*

International Journal of Hygiene and Environmental Health 218 (2015) 603–615

Contents lists available at ScienceDirect

International Journal of Hygiene and Environmental Health

journal homepage: www.elsevier.com/locate/ijheh

2015

The effects of phthalate and nonylphenol exposure on body size and secondary sexual characteristics during puberty

Jia-Woei Hou[a,b,1], Ching-Ling Lin[b,c,1], Yen-An Tsai[d], Chia-Huang Chang[d], Kai-Wei Liao[d], Ching-Jung Yu[d], Winnie Yang[e], Ming-Jun Lee[e], Po-Chin Huang[f], Chien-Wen Sun[g], Yin-Han Wang[h], Fang-Ru Lin[i], Wen-Chiu Wu[j], Meng-Chih Lee[k], Wen-Harn Pan[l,m], Bai-Hsiun Chen[n,o], Ming-Tsang Wu[p,q,r], Chu-Chih Chen[h], Shu-Li Wang[g], Ching-Chang Lee[s,t], Chao Agnes Hsiung[u], Mei-Lien Chen[d,*]

Phthalate and thyroid dysfunction

OPEN ACCESS Freely available online

PLOS ONE

Intake of Phthalate-Tainted Foods Alters Thyroid Functions in Taiwanese Children

2013

Ming-Tsang Wu[1,2,3]*, Chia-Fang Wu[1], Bai-Hsiun Chen[4], Eric K. Chen[5,6], Yi-Ling Chen[7], Jentaie Shiea[8], Wei-Te Lee[9], Mei-Chyn Chao[4], Jiunn-Ren Wu[4]*

RESEARCH ARTICLE

Early Phthalates Exposure in Pregnant Women Is Associated with Alteration of Thyroid Hormones

PLoS One 2016

Po-Chin Huang[1,2☯]*, Chih-Hsin Tsai[1], Wei-Yen Liang[1], Sih-Syuan Li[1], Han-Bin Huang[3], Pao-Lin Kuo[4☯]

SCIENTIFIC REPORTS

OPEN

Intake of Phthalate-tainted Foods and Serum Thyroid Hormones in Taiwanese Children and Adolescents

2016

Received: 18 March 2016
Accepted: 05 July 2016
Published: 29 July 2016

Hui-Ju Tsai[1,2], Chia-Fang Wu[2,3], Yi-Chun Tsai[4], Po-Chin Huang[5], Mei-Lien Chen[6], Shu-Li Wang[7], Bai-Hsiun Chen[8,9], Chu-Chih Chen[10], Wen-Chiu Wu[11], Pi-Shan Hsu[12], Chao A. Hsiung[10] & Ming-Tsang Wu[2,3,9,13]

Phthalate and neurodevelopment

RESEARCH ARTICLE

Fetal and Childhood Exposure to Phthalate Diesters and Cognitive Function in Children Up to 12 Years of Age: Taiwanese Maternal and Infant Cohort Study

PLoS One 2015

Han-Bin Huang[1], Hsin-Yi Chen[2], Pen-Hua Su[3], Po-Chin Huang[4], Chien-Wen Sun[5], Chien-Jen Wang[5], Hsiao-Yen Chen[5], Chao A. Hsiung[6☯*], Shu-Li Wang[1,5,7☯*]

EHR 2015

Prenatal Exposure to Phthalate Esters and Behavioral Syndromes in Children at 8 Years of Age: Taiwan Maternal and Infant Cohort Study

Yin-Ju Lien,[1,2] Hsiu-Ying Ku,[3,4*] Pen-Hua Su,[5] Suh-Jen Chen,[6,7] Hsiao-Yen Chen,[4] Pao-Chi Liao,[8] Wei-J. Chen,[2] and Shu-Li Wang[3,4,9]*

Phthalate and renal dysfunction

Environment International 89–90 (2016) 129–137

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

Intake of phthalate-tainted foods and microalbuminuria in children: The 2011 Taiwan food scandal

Hui-Ju Tsai [a,b,1], Bai-Hsiun Chen [c,d,1], Chia-Fang Wu [b,e], Shu-Li Wang [f], Po-Chin Huang [f], Yi-Chun Tsai [g], Mei-Lien Chen [h], Chi-Kung Ho [b,i], Chao A. Hsiung [j,*], Ming-Tsang Wu [b,d,e,k,l,**]

2016

Phthalate and allergic diseases

Environment International 62 (2014) 48–54

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

Early life phthalate exposure and atopic disorders in children: A prospective birth cohort study☆

I-Jen Wang [a,b,c], Ching-Chun Lin [d], Yen-Ju Lin [d], Wu-Shiun Hsieh [e,1], Pau-Chung Chen [d,f,g,h,*,1]

2014

RESEARCH ARTICLE

Prenatal and Postnatal Exposure to Phthalate Esters and Asthma: A 9-Year Follow-Up Study of a Taiwanese Birth Cohort

Hsiu Ying Ku[1,2], Pen Hua Su[3], Hui Ju Wen[2], Hai Lun Sun[4], Chien Jen Wang[2], Hsiao Yen Chen[2], Jouni J. K. Jaakkola[5,6], Shu-Li Wang[1,2,7,8]*, TMICS Group[¶]

PLoS One 2015

Nonyphenol

Chemosphere 93 (2013) 1145–1152

Contents lists available at SciVerse ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

2013

The association between maternal nonylphenol exposure and parity on neonatal birth weight: A cohort study in Taiwan

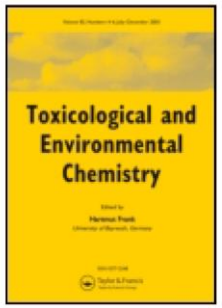
Chia-Huang Chang[a], Mei-Lien Chen[a], Kai-Wei Liao[a], Yen-An Tsai[a], I-Fang Mao[b], Tzu-Hao Wang[c], Shiaw-Min Hwang[d], Yu-Jen Chang[d], Ming-Song Tsai[e,f,g,*]

PloS One 2016

Attention Deficit/Hyperactivity Disorder and Urinary Nonylphenol Levels: A Case-Control Study in Taiwanese Children

Ching-Jung Yu[1], Jung-Chieh Du[2], Hsien-Chih Chiou[3], Shang-Han Yang[1], Kai-Wei Liao[1], Winnie Yang[4], Ming-Yi Chung[5], Ling-Chu Chien[6], Betau Hwang[2], Mei-Lien Chen[1]*

2014



Toxicological & Environmental Chemistry

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gtec20

A review on environmental distributions and risk management of phenols pertaining to the endocrine disrupting chemicals in Taiwan

Wen-Tien Tsai[a]

[a] Graduate Institute of Bioresources, National Pingtung University of Science and Technology, Pingtung, Taiwan

Published online: 26 Jul 2013.

Perfluoroalkyl substances (PFASs)

Research | Children's Health

2015

Association between Maternal Serum Perfluoroalkyl Substances during Pregnancy and Maternal and Cord Thyroid Hormones: Taiwan Maternal and Infant Cohort Study

Yan Wang,[1] Walter J. Rogan,[1] Pau-Chung Chen,[2,3,4] Guang-Wen Lien,[2] Hsiao-Yen Chen,[5] Ying-Chih Tseng,[6] Matthew P. Longnecker,[1] and Shu-Li Wang[1,5,7]

Chemosphere 156 (2016) 118–127

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

2016

Perfluoroalkyl substances in cord blood and attention deficit/hyperactivity disorder symptoms in seven-year-old children

Guang-Wen Lien [a], Ching-Chun Huang [a, b], Jia-Shian Shiu [a], Mei-Huei Chen [a], Wu-Shiun Hsieh [c], Yue-Liang Guo [a, b, **, 1], Pau-Chung Chen [a, b, d, *, 1]

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

2016

Association of perfluoroalkyl substances exposure with reproductive hormone levels in adolescents: By sex status

Yang Zhou [a,1], Li-Wen Hu [a,1], Zhengmin (Min) Qian [b], Jen-Jen Chang [b], Chris King [c], Gunther Paul [d], Shao Lin [e], Pau-Chung Chen [f,g], Yungling Leo Lee [g,h,*], Guang-Hui Dong [a,**]

Academic or Public Ignorance?

- Water
- Heavy metals, pesticides, herbicides, fungicides, insecticides, etc.
- Cosmetics, toys, personal-care products, furniture, house wares, etc.
- Occupation hazards
- Stress
- Poverty

Disinfection by products in water

OPEN ACCESS Freely available online

PLOS one

Risk of Stillbirth in the Relation to Water Disinfection By-Products: A Population-Based Case-Control Study in Taiwan

2012

Bing-Fang Hwang[1]*, Jouni J. K. Jaakkola[2]

ELSEVIER

Available online at www.sciencedirect.com

ScienceDirect

Environmental Research 104 (2007) 390–395

Environmental Research

www.elsevier.com/locate/envres

2007

Association between trihalomethane concentrations in drinking water and adverse pregnancy outcome in Taiwan

Chun-Yuh Yang[a,*], Zhi-Ping Xiao[a], Shu-Chen Ho[b], Trong-Neng Wu[c], Shang-Shyue Tsai[d]

SCIENTIFIC REPORTS

OPEN

Impacts of Typhoon Soudelor (2015) on the water quality of Taipei, Taiwan

2015

Received: 09 October 2015
Accepted: 12 April 2016

Hoda Fakour[1], Shang-Lien Lo[1] & Tsair-Fuh Lin[2]

Environmental Research Section A **89,** 12–18 (2002)
doi:10.1006/enrs.2002.4342, available online at http://www.idealibrary.com on IDEAL®

Heavy metal effect on children

2002

Relationship between Blood Lead Concentrations and Learning Achievement among Primary School Children in Taiwan[1]

Chao-Ling Wang,*,† Hung-Yi Chuang,‡,§ Chi-Kung Ho,†,‡ Chun-Yuh Yang,§ Jin-Lian Tsai,†
Ting-Shan Wu,‖,¶ and Trong-Neng Wu†,[2]

Environment International 40 (2012) 88–96

Contents lists available at SciVerse ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

2012

Childhood blood lead levels and intellectual development after ban of leaded gasoline in Taiwan: A 9-year prospective study

Po-Chin Huang [a], Pen-Hua Su [b,c], Hsin-Yi Chen [d], Han-Bin Huang [a,f], Jin-Lian Tsai [e],
Hsin-I Huang [a], Shu-Li Wang [a,g,*]

Environmental Research 123 (2013) 52–57

Contents lists available at SciVerse ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

2013

In utero exposure to environmental lead and manganese and neurodevelopment at 2 years of age

Ching-Chun Lin [a], Yu-Chuan Chen [a], Feng-Chiao Su [a], Chien-Mu Lin [b,c], Hua-Fang Liao [d],
Yaw-Huei Hwang [a,e], Wu-Shiun Hsieh [f], Suh-Fang Jeng [d], Yi-Ning Su [g,h], Pau-Chung Chen [a,e,i,*]

Heavy metal effect

Environmental Research 123 (2013) 52–57

Contents lists available at SciVerse ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

2013

In utero exposure to environmental lead and manganese and neurodevelopment at 2 years of age

Ching-Chun Lin [a], Yu-Chuan Chen [a], Feng-Chiao Su [a], Chien-Mu Lin [b,c], Hua-Fang Liao [d], Yaw-Huei Hwang [a,e], Wu-Shiun Hsieh [f], Suh-Fang Jeng [d], Yi-Ning Su [g,h], Pau-Chung Chen [a,e,i,*]

2015

RESEARCH ARTICLE Open Access

Relationship between risk factors for infertility in women and lead, cadmium, and arsenic blood levels: a cross-sectional study from Taiwan

Hsiao-Ling Lei[1], Hsiao-Jui Wei[2,3], Hsin-Yi Ho[2,3], Kai-Wei Liao[1] and Ling-Chu Chien[1*]

OPEN ACCESS Freely available online PLOS ONE

2014

Maternal Arsenic Exposure and DNA Damage Biomarkers, and the Associations with Birth Outcomes in a General Population from Taiwan

Wei-Chun Chou[1,2], Yu-The Chung[2], Hsiao-Yen Chen[2], Chien-Jen Wang[2], Tsung-Ho Ying[3], Chun-Yu Chuang[1]*, Ying-Chih Tseng[4], Shu-Li Wang[2,5]*

The Flint Incident

The Economist

Poisoned water

That Flinty taste

How Michigan's state government endangered the people of Flint

Jan 23rd 2016 | LANSING | From the print edition

How A Stubborn Pediatrician Forced The State To Take Flint's Water Crisis Seriously

Dr. Mona Hanna-Attisha side-stepped the bureaucracy when she discovered what was happening in Flint.

01/21/2016 02:15 pm ET

Chris D'Angelo
Associate Editor, HuffPost Hawaii

Pesticides, herbicides, fungicides, insecticides, etc.

The Regulation of Transcriptome Responses in Zebrafish Embryo Exposure to Triadimefon

Environ Toxicol 2016

Li-Sung Hsu,[1,3*] Bin-Hao Chiou,[2] Tung-Wei Hsu,[1] Chien-Chia Wang,[2] Ssu Ching Chen[2*]

Chemosphere 2016

Health risk assessment of the intake of butyltin and phenyltin compounds from fish and seafood in Taiwanese population

Ching-Chang Lee [a, b], Ya-Chen Hsu [d], Yi-Ting Kao [d], Hsiu-Ling Chen [c, *]

Andrology 2016

Increased risk of attention-deficit/hyperactivity disorder associated with exposure to organophosphate pesticide in Taiwanese children

[1]C.-J. Yu, [2]J.-C. Du, [3]H.-C. Chiou, [4]M.-Y. Chung, [5]W. Yang, [6]Y.-S. Chen, [7]M.-R. Fuh, [8]L.-C. Chien, [2]B. Hwang and [1]M.-L. Chen

Occupational hazards

- Subfertility
- Pregnancy complications
- Child development

Have we paid enough attention to them?

Human Reproduction Update, Vol.11, No.1 pp. 43–57, 2005
Advance Access publication December 15, 2004.
doi:10.1093/humupd/dmh055

2005

Environmental and occupational factors affecting fertility and IVF success

Edward V.Younglai[1], Alison C.Holloway and Warren G.Foster

CLINICAL OPINION www.AJOG.org

2012

OBSTETRICS

Toxic environmental chemicals: the role of reproductive health professionals in preventing harmful exposures

Patrice Sutton, MPH; Tracey J. Woodruff, PhD, MPH; Joanne Perron, MD; Naomi Stotland, MD; Jeanne A. Conry, MD, PhD; Mark D. Miller, MD, MPH; Linda C. Giudice, MD, PhD

Human Reproduction Update, Vol.18, No.3 pp. 284–300, 2012
Advanced Access publication on March 19, 2012 doi:10.1093/humupd/dms005

human reproduction update

2012

Occupational exposure to chemical substances and time to pregnancy: a systematic review

Claudia A. Snijder [1], Egbert te Velde [1,2], Nel Roeleveld [3], and Alex Burdorf [1,*]

Human Reproduction, Vol.27, No.3 pp. 910–920, 2012
Advanced Access publication on January 2, 2012 doi:10.1093/humrep/der437

human reproduction

ORIGINAL ARTICLE *Reproductive epidemiology*

2012

Occupational exposure to chemicals and fetal growth: the Generation R Study

Claudia A. Snijder[1,2], Nel Roeleveld[3], Egbert te Velde[2,4], Eric A.P. Steegers[5], Hein Raat[2], Albert Hofman[1,6], Vincent W.V. Jaddoe[1,6,7], and Alex Burdorf[2,*]

Human Reproduction, Vol.27, No.5 pp. 1510–1517, 2012
Advanced Access publication on February 22, 2012 doi:10.1093/humrep/des043

human reproduction

ORIGINAL ARTICLE *Reproductive epidemiology*

2012

Congenital heart defects and parental occupational exposure to chemicals

Claudia A. Snijder[1,2], Ingrid J. Vlot[1], Alex Burdorf[2], Sylvia A. Obermann-Borst[1], Willem A. Helbing[3], Mark F. Wildhagen[1,4], Eric A.P. Steegers[1], and Régine P.M. Steegers-Theunissen[1,5,6,*]

Occupational Medicine 2012;**62:**88–97
doi:10.1093/occmed/kqr198

IN-DEPTH REVIEW

2012

Pregnancy in the workplace

H. M. Salihu[1,2], J. Myers[3] and E. M. August[3]

Stress and maternal-child health

- Correlation exists between stress, reproductive outcomes, and health of the offspring.
- The female employment rate has been increasing globally.
- There is no absolute correlation between working hours and stress.

女性參與勞動比例越來越高

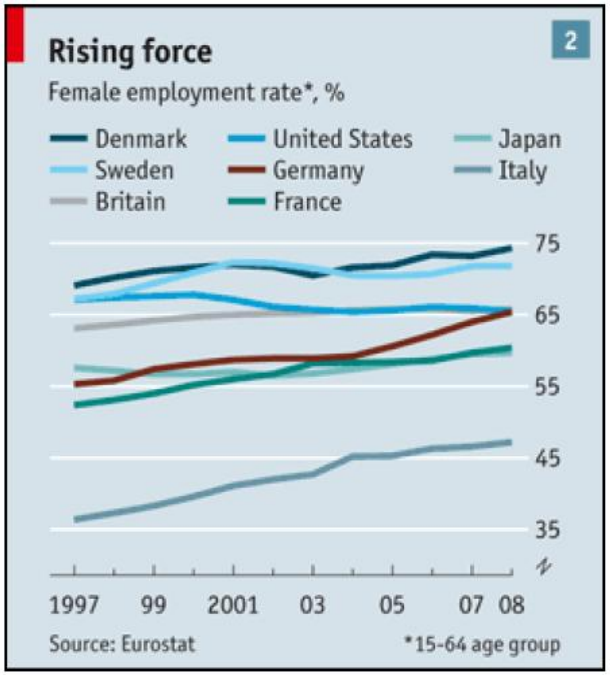
Women in the workforce

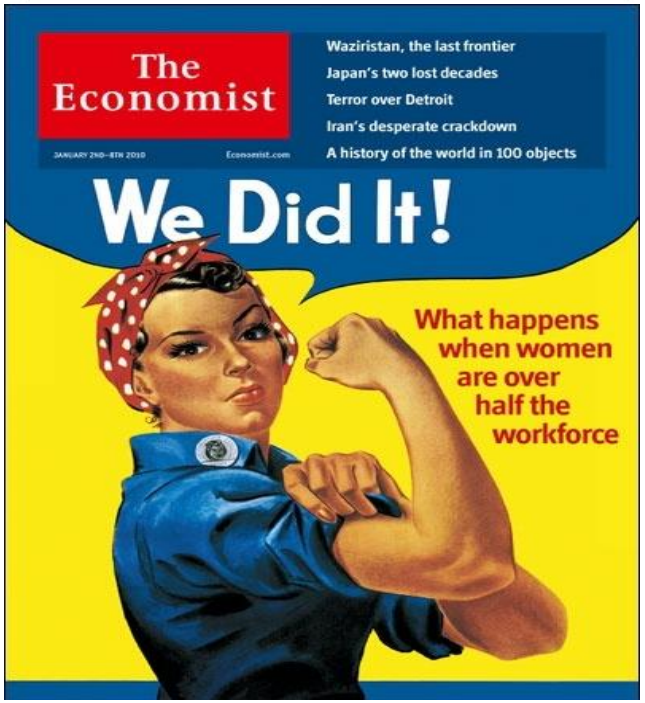
Female power

Dec 30th 2009
From *The Economist* print edition

Across the rich world more women are working than ever before. Coping with this change will be one of the great challenges of the coming decades

C Dunlop





The Economist 2019

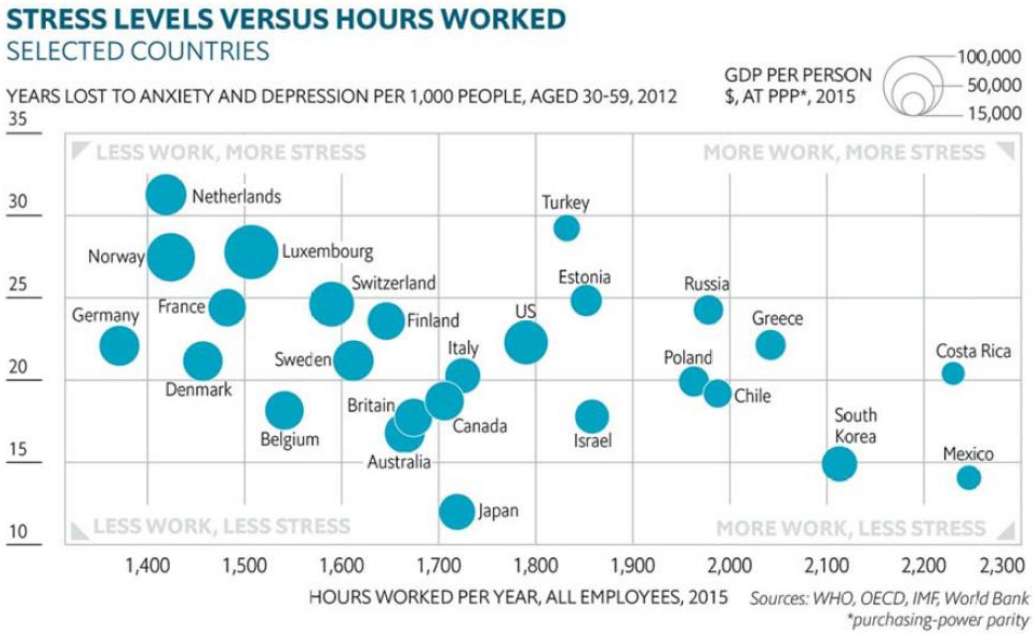
The Economist 1843

What the numbers say

STRESS TESTING

Working long hours may not be as bad for our health as we think

JAMES TOZER | OCTOBER/NOVEMBER 2016



The Economist 1943

Working activity and night shift

- (Marginally) increased reproductive risk

Review

Influence of Shift Work on Early Reproductive Outcomes

A Systematic Review and Meta-analysis

Linden J. Stocker, BM, BS, Nicholas S. Macklon, MD, MBChB, Ying C. Cheong, MD, MBChB, and Susan J. Bewley, MD, BMBS

Obstet Gynecol 2014

Int Arch Occup Environ Health (2014) 87:835–849
DOI 10.1007/s00420-014-0934-9

REVIEW ARTICLE

Shift work, long working hours and preterm birth: a systematic review and meta-analysis

M. J. G. J. van Melick · M. D. M. van Beukering · B. W. Mol · M. H. W. Frings-Dresen · C. T. J. Hulshof

2014

Inequality

The rich and the rest

What to do (and not to do) about inequality

- Jan 20th 2011 | from PRINT EDITION

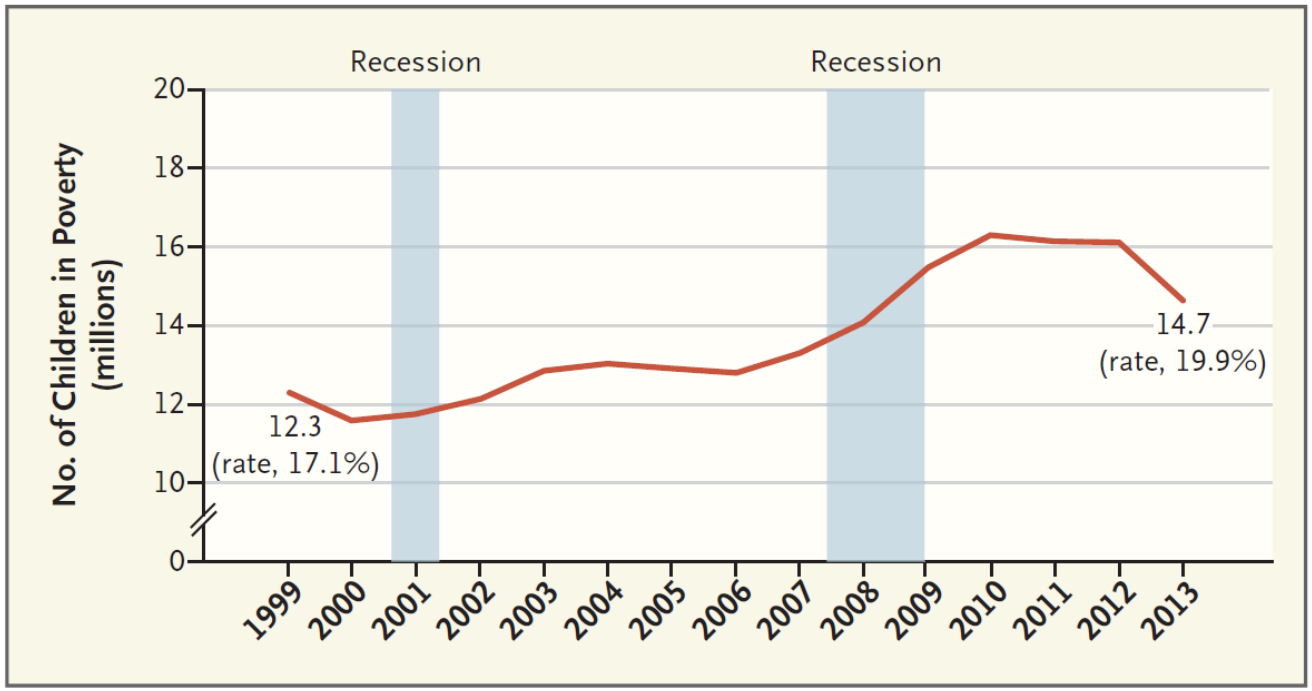
Polarization
社會的兩極化

The Economist 2011

Saving Tiny Tim — Pediatrics and Childhood Poverty in the United States

Perri Klass, M.D.

NEJM 2016



Number of Children in Poverty (and Child Poverty Rate) in the United States, 1999–2013.

Data are from the U.S. Census Bureau.

REVIEW

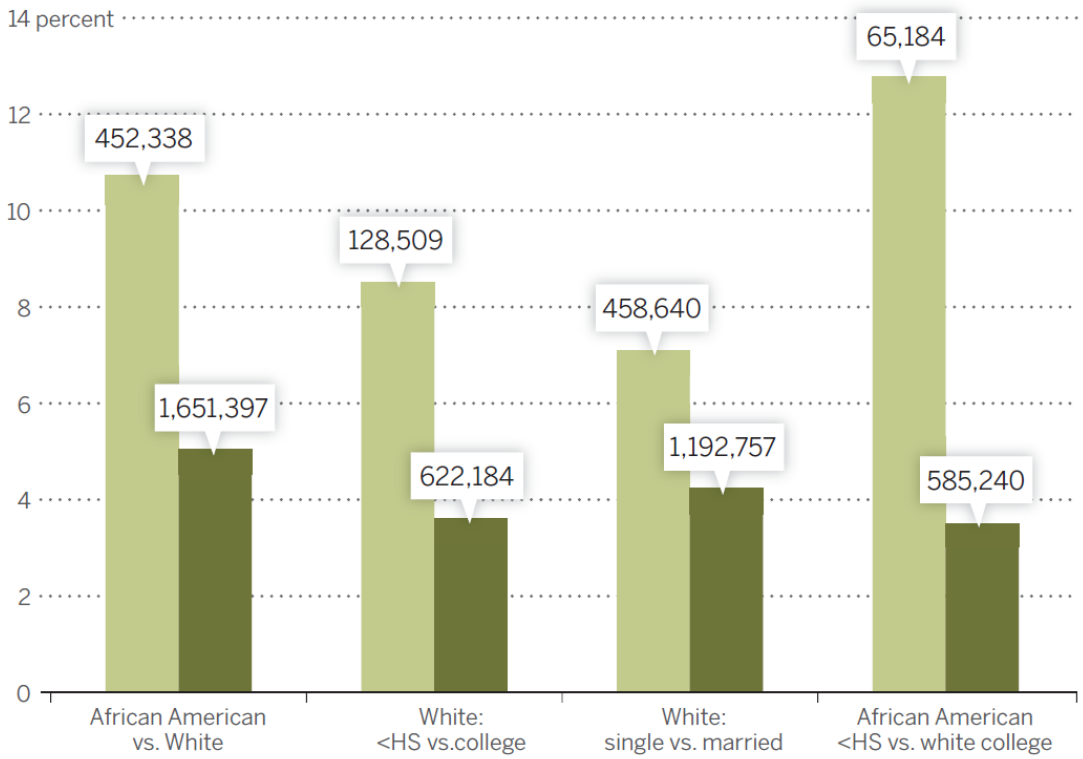
Science Magazine 2014

The intergenerational transmission of inequality: Maternal disadvantage and health at birth

Anna Aizer[1,2] and Janet Currie[2,3]*

Differences in the percent of U.S. infants with birth weight <2500g, by maternal characteristics, 2011

Low birth weight



Childhood poverty, chronic stress, and adult working memory

Gary W. Evans[1] and Michelle A. Schamberg

PNAS 2009

Poverty Impedes Cognitive Function

Anandi Mani,[1] Sendhil Mullainathan,[2]* Eldar Shafir,[3]* Jiaying Zhao[4]

Science 2013

Family income, parental education and brain structure in children and adolescents

Kimberly G Noble[1,2,32], Suzanne M Houston[3–5,32], Natalie H Brito[6], Hauke Bartsch[7], Eric Kan[4,5], Joshua M Kuperman[8–10], Natacha Akshoomoff[10–12], David G Amaral[10,13], Cinnamon S Bloss[10,14], Ondrej Libiger[15], Nicholas J Schork[16], Sarah S Murray[10,17], B J Casey[10,18], Linda Chang[10,19], Thomas M Ernst[10,19], Jean A Frazier[10,20], Jeffrey R Gruen[10,21–23], David N Kennedy[10,20], Peter Van Zijl[10,24,25], Stewart Mostofsky[10,25], Walter E Kaufmann[10,26,27], Tal Kenet[10,27,28], Anders M Dale[8–10,29–31], Terry L Jernigan[10–12,29] & Elizabeth R Sowell[4,5,10]

Nature Neuroscience 2014

An epigenetic mechanism links socioeconomic status to changes in depression-related brain function in high-risk adolescents

JR Swartz[1], AR Hariri[1,3] and DE Williamson[2,3]

Molecular Psychiatry 2016

Socioeconomic Influences on Child Health
Building New Ladders of Social Opportunity

Neal Halfon, MD, MPH

JAMA 2014

Health is an aspiration of health and human need.

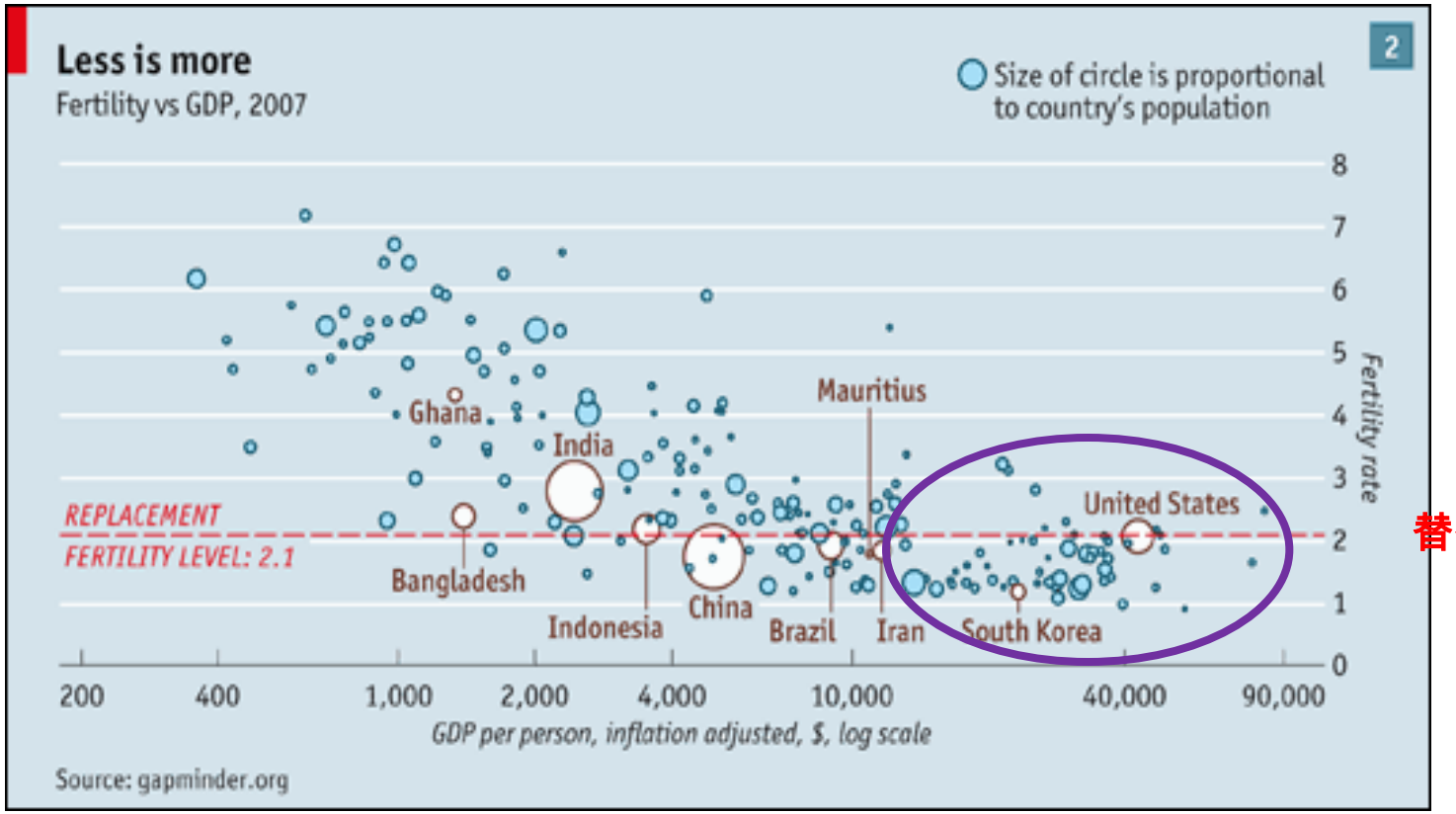
Original Investigation

Associations of Housing Mobility Interventions for Children in High-Poverty Neighborhoods With Subsequent Mental Disorders During Adolescence

Ronald C. Kessler, PhD; Greg J. Duncan, PhD; Lisa A. Gennetian, PhD; Lawrence F. Katz, PhD; Jeffrey R. Kling, PhD; Nancy A. Sampson, BA; Lisa Sanbonmatsu, PhD; Alan M. Zaslavsky, PhD; Jens Ludwig, PhD

Fertility, Sterility, Fertility Rate – Complex Intertwining issues

在過去，低生育率有助於提升生活水準

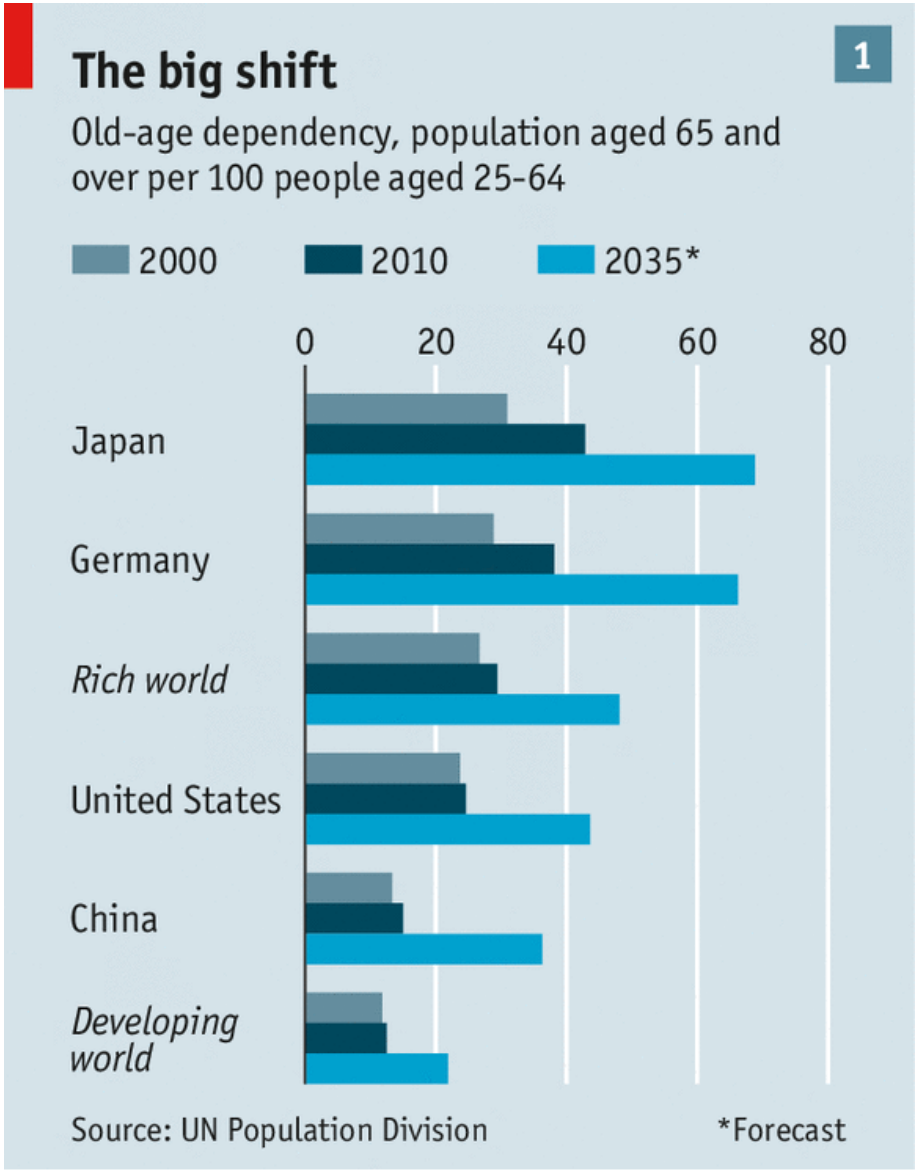


替代生育率 2.1

Fertility and living standards（生育率與生活水平）

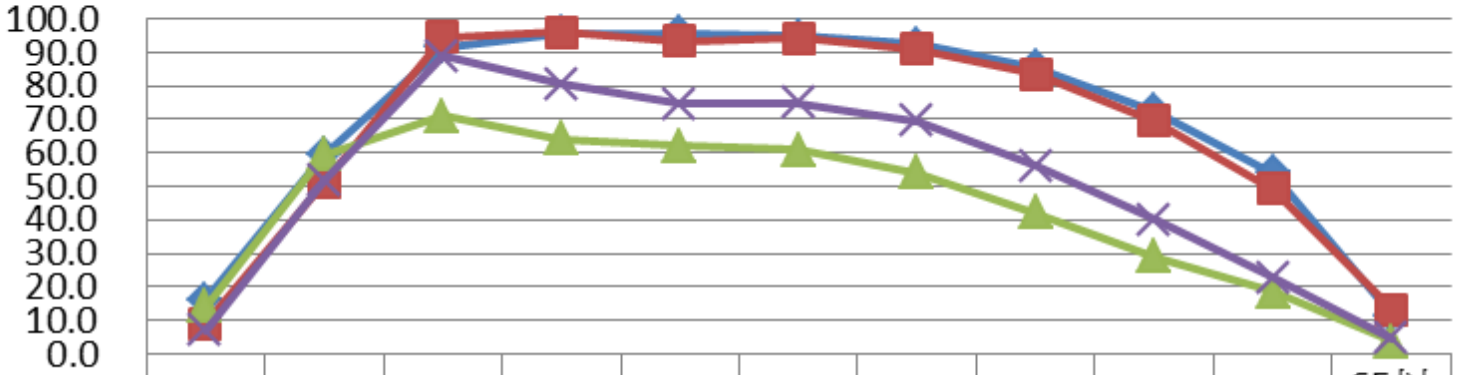
Go forth and multiply a lot less: Lower fertility is changing the world for the better (in the past)

Oct 29th 2009 *The Economist*



The Economist 2014

台灣男性、女性勞參率 單位：%



	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65以上
2000(男性)	16.24	59.43	91.49	95.72	95.8	94.91	92.48	85.56	72.59	53.92	11.25
2014(男性)	8.92	50.96	94.58	96.07	93.43	94.32	91	83.46	69.43	49.4	13.31
2000(女性)	14	59.39	71	64.2	62.21	60.98	54.13	42.14	28.84	18.42	3.73
2014(女性)	6.97	51.72	88.84	80.62	74.54	75.02	69.63	56.11	40.04	22.6	4.63

Courtesy of 連賢明教授

三頭六臂的女人：如何減少職業婦女的 壓力？

NATUREJOBS | NATUREJOBS BLOG

7 posts to help you find the right work-life balance with children

04 Mar 2016 | 12:00 GMT | Posted by Jack Leeming | Category: Academia, Blog, Diversity, Faculty

The Economist

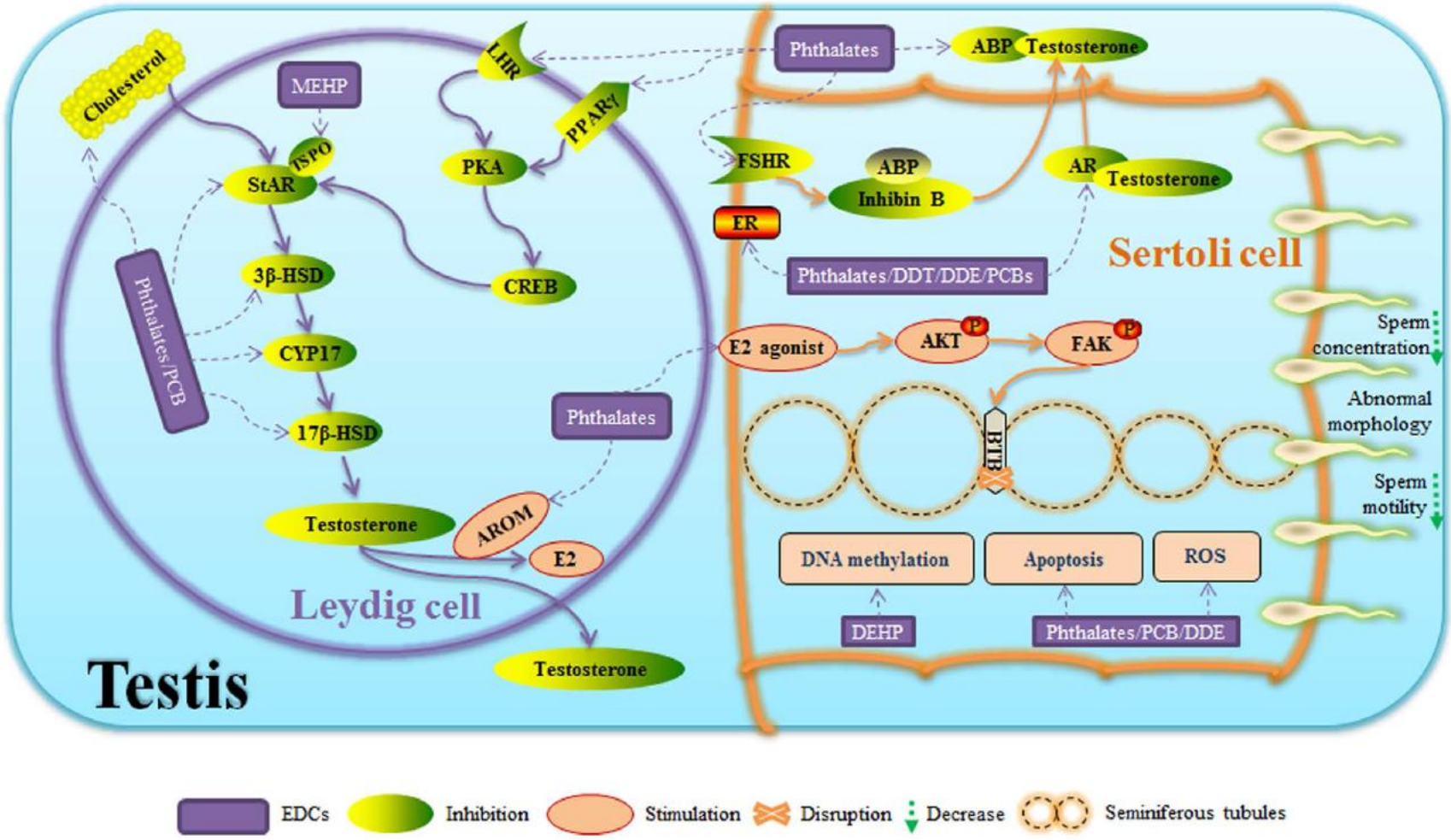
Demography and desire

The empty crib

Our poll of 19 countries reveals a neglected global scourge: the number of would-be parents who have fewer children than they want—or none at all

Aug 27th 2016 | ATHENS, LAGOS AND MUMBAI

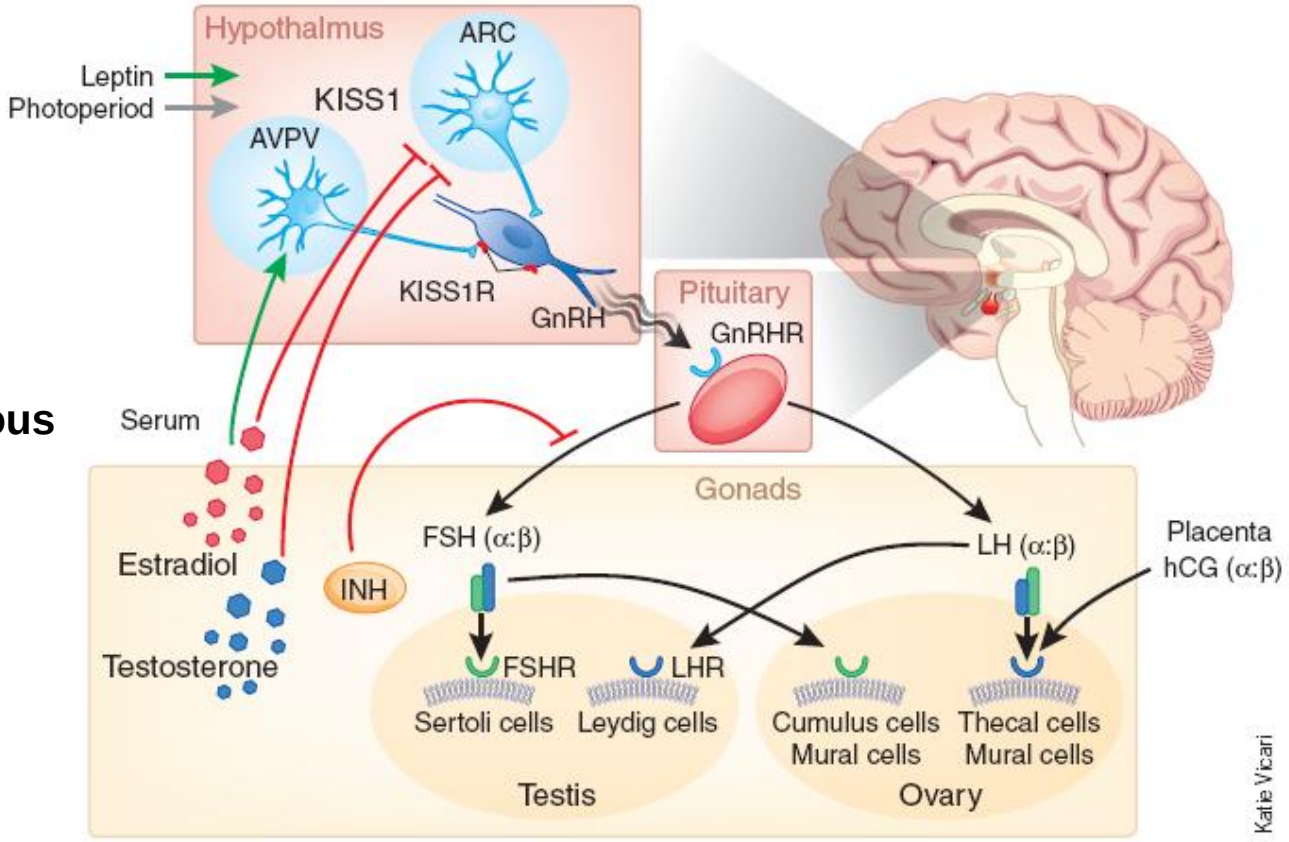
EDC and spermatogenesis



A schematic mechanism on the effects of phthalate esters and organochlorines on testosterone and sperm quality. The classic EDCs, phthalate esters and organochlorines, in relation to abnormal sperm quality: a systematic review with meta-analysis. Chao Wang et al. *Scientific Reports 2016*

Environmental contaminants and endocrine dysfunction

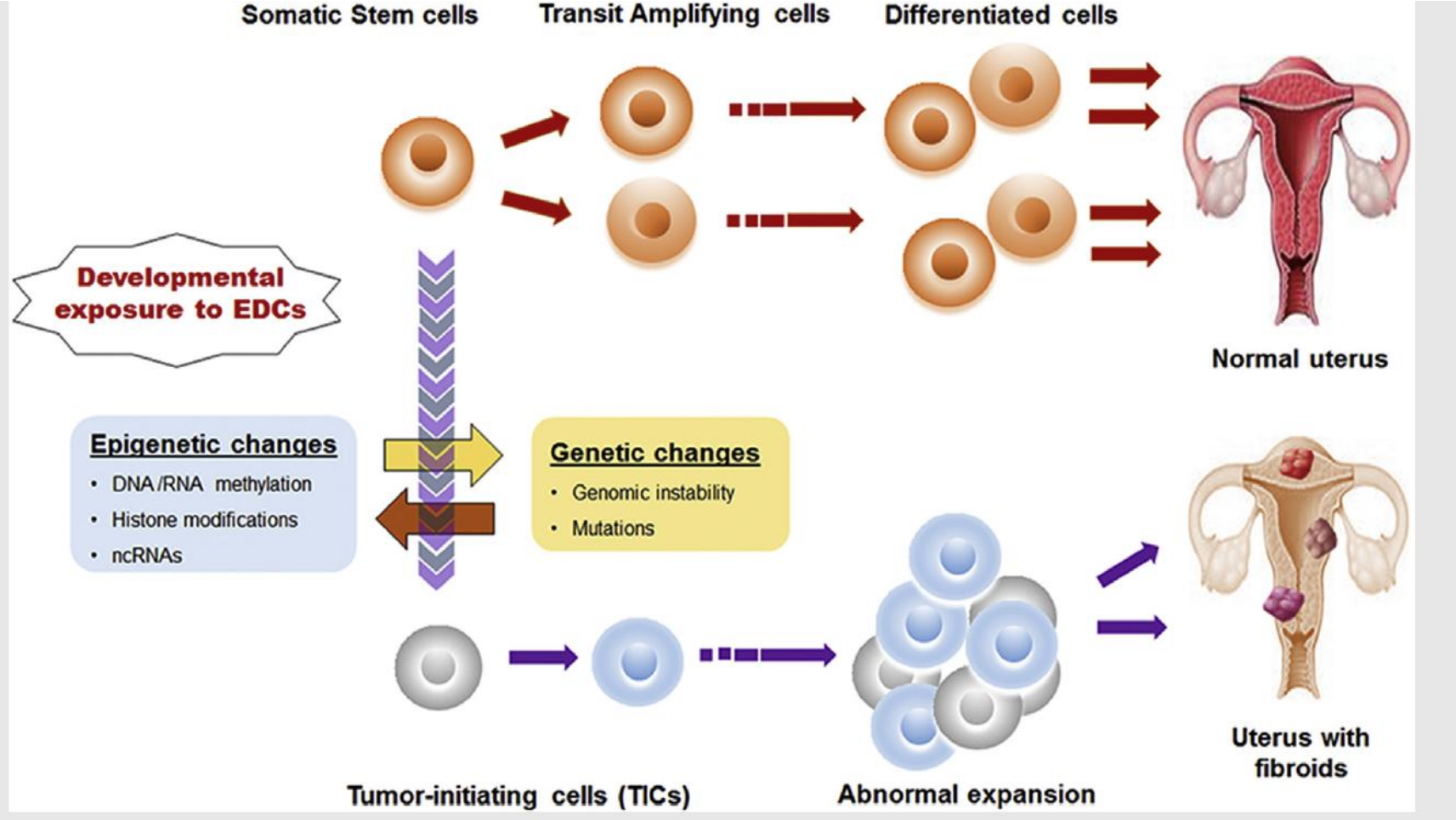
Endogenous and exogenous hormones (EDC)



Neuroendocrine control of pituitary and gonadal function

Martin M Matzuk & Dolores J Lamb. **The biology of infertility: research advances and clinical challenges.** ***Nature Medicine*** *2008 Nov*

EDC and uterine fibroids



Developmental exposure to endocrine-disrupting chemicals (EDCs) induces genetic/epigenetic abnormalities in myometrial stem cells, which lead to uterine fibroid (UF) development. Environmental factors including EDCs induce genetic/ epigenetic alterations, thereby leading to the conversion of myometrial stem cells into tumor initiating cells, eventually giving rise to the formation of UFs.

Tiffany A. Katz et al. EDCs and uterine fibroids. Fertil Steril 2016.

What ought be done?

- Help couples who crave for babies (but are sub-fertile or miscarry repeatedly).
- Unload environmental and social factors accountable for reproductive problems.
- Provide incentives for child-bearing.

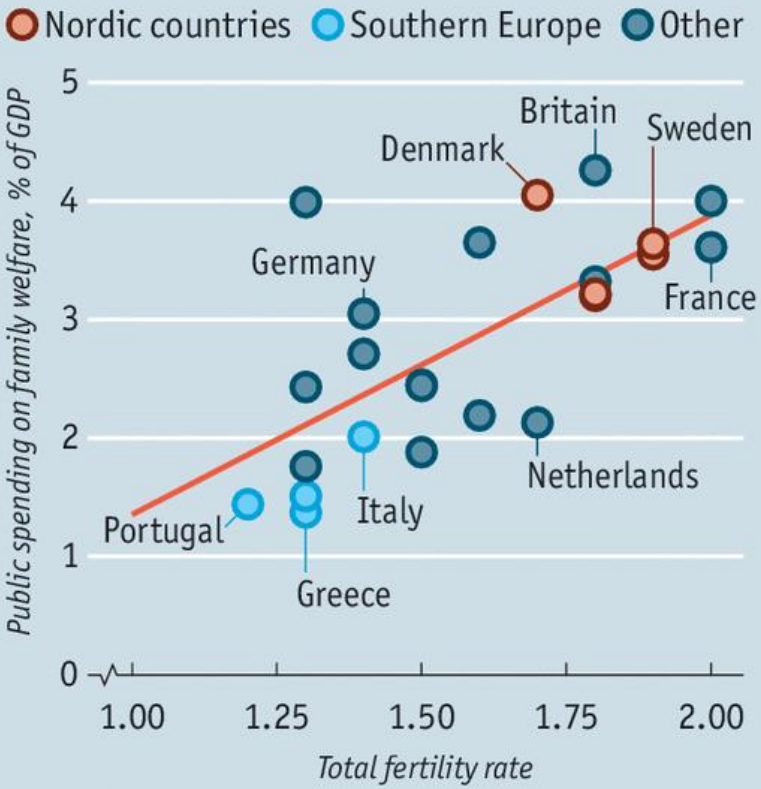
Breaking the baby strike

People in rich countries can be coaxed into having more children. But lazy husbands and lovely cities stand in the way

Jul 25th 2015 | URLA | From the print edition

Buy, buy baby

Family-welfare spending and fertility rate in Europe, 2013



Source: OECD

The Economist 2015

家庭支出與生育率

婦幼醫學學門

- 規劃著眼於促進跨領域合作（興利）與打破既有的疆界框架（除弊）兩大目的。
- 導引台灣生命科學領域研究發展之進步。

- **104年新規劃學門**
  - **18個學門，47個子學門，33個審查分組。**

103.11.10.

新學門	包含學科	學門究主題涵蓋範圍（scope）
婦幼醫學	婦產醫學	針對婦女及小兒相關疾病；如腫瘤、內分泌、不孕症、更年期、產前、週產期及新生兒、兒童成長與發育、遺傳、兒童及青少年疾病等，研究其病理機轉、診斷、治療與預防之科學。
	小兒醫學	

The status quo

- 最近三年科技部申請計畫，小兒科和婦產科所提出的環境因素和婦幼相關研究計畫都不超過總計畫的10%，通過的比例也未超出平均計畫通過率（大約40%，每年不超過10個計劃）。
- 大部分相關研究經費應該來自科技部其他學門，國衛院、環保署等單位。
- 傳染及免疫疾病是小兒科研究的顯學；婦女癌症是婦產科研究的顯學。「顯學」可能反應次專科之生態或臨床醫師對問題之敏感度。

相關單位

- 整合婦幼及環境醫學
  科技部：生命科學研究發展司（婦幼醫學學門、社會醫學學門中之環境醫學組、農業環境科學學門）、工程技術研究發展司、科教發展及國際合作司、自然科學及永續研究發展司前瞻及應用科技司
  衛服部、國衛院

What ought to be done?

- Given over-diversified funding sources, institutional effort is needed to integrate maternal-child health research. (e.g. Generation R study, LIFE study, Project TENDER)
- Establish maternal-child cohort and biobanks
- Identify **priority issues**
- Explore neglected (but critical) issues
- Evidence-based study to reveal disease burden and pave the way to reduce disease burden
- Ethical-legal-social issues: social consciousness, corporate social responsibility (CSR), medical education, the role of governmental regulation, etc.
- Other issues: sin tax and various fiscal tools, energy policy, transformation of industrial structure, etc.

The priority issues - a personal perspective

- Integrate maternal-child health research (and other environmental health researches) by institutional effort.
- Establish maternal-child cohort, biobanks, as well as **data-sharing policy**.
- All infrastructures are designed to serve common interests of the Taiwanese population by creating a win-win situation for all participants (including academia and study subjects).

MOCEH Study (Korea)

Science of the Total Environment 481 (2014) 439–445

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Prenatal exposure to PM_{10} and NO_2 and children's neurodevelopment from birth to 24 months of age: Mothers and Children's Environmental Health (MOCEH) study

Eunjeong Kim [a], Hyesook Park [a], Yun-Chul Hong [b], Mina Ha [c], Yangho Kim [d], Boong-Nyun Kim [e], Yeni Kim [f], Young-Man Roh [g], Bo-Eun Lee [h], Jung-Min Ryu [h], Byung-Mi Kim [a], Eun-Hee Ha [a,*]

International Journal of Hygiene and Environmental Health 217 (2014) 328–334

Contents lists available at ScienceDirect

International Journal of Hygiene and Environmental Health

journal homepage: www.elsevier.com/locate/ijheh

Prenatal bisphenol A and birth outcomes: MOCEH (Mothers and Children's Environmental Health) study

Bo-Eun Lee [a,b], Hyesook Park [b], Yun-Chul Hong [c], Mina Ha [d], Yangho Kim [e], Namsoo Chang [f], Boong-Nyun Kim [g], Young Ju Kim [h], Seung-Do Yu [a], Eun-Hee Ha [b,*]

Eum *et al. Environmental Health* 2014, **13**:31
http://www.ehjournal.net/content/13/1/31

ENVIRONMENTAL HEALTH

RESEARCH **Open Access**

Maternal blood manganese level and birth weight: a MOCEH birth cohort study

Jin-Hee Eum [1,2], Hae-Kwan Cheong [1,2*], Eun-Hee Ha [3], Mina Ha [4], Yangho Kim [5], Yun-Chul Hong [6], Hyesook Park [3] and Namsoo Chang [7]

Maternal Blood Manganese and Early Neurodevelopment: The Mothers and Children's Environmental Health (MOCEH) Study

Soo Eun Chung,[1,2] Hae-Kwan Cheong,[1,2] Eun-Hee Ha,[3] Boong-Nyun Kim,[4,5] Mina Ha,[6] Yangho Kim,[7] Yun-Chul Hong,[8] Hyesook Park,[3] and Se-Young Oh[9]

EHP 2015

EHR 2016

Perspectives | Brief Communication

A Section 508–conformant HTML version of this article is available at http://dx.doi.org/10.1289/EHP358.

Project TENDR: Targeting Environmental Neuro-Developmental Risks. The TENDR Consensus Statement

http://dx.doi.org/10.1289/EHP358

JAMA 2016

News & Analysis

Medical News & Perspectives

Call to Action on Neurotoxin Exposure in Pregnant Women and Children

Jennifer Abbasi

Endocrinology 156: 3405–3407, 2015

pptoxIV

Prenatal Programming and Toxicity (PPTOX) Introduction

Linda S. Birnbaum and Mark F. Miller

With the abrupt cancellation of the National Children's Study this past year, it will be important for the scientific community to establish a large prospective birth cohort that provides multiple early measures of maternal exposures, frequent observations of offspring over time, clinical databases for subsequent analyses, and biological repositories of stored samples. Although only in the initial planning phase, the Precision Medicine initiative, announced by President Obama and being established by the NIH, may offer great opportunities to advance our understanding of PPTOX and the etiology of disease.

Estimating Burden and Disease Costs of Exposure to Endocrine-Disrupting Chemicals in the European Union

Leonardo Trasande, R. Thomas Zoeller, Ulla Hass, Andreas Kortenkamp, Philippe Grandjean, John Peterson Myers, Joseph DiGangi, Martine Bellanger, Russ Hauser, Juliette Legler, Niels E. Skakkebaek, and Jerrold J. Heindel

Female Reproductive Disorders, Diseases, and Costs of Exposure to Endocrine Disrupting Chemicals in the European Union

Patricia A. Hunt, Sheela Sathyanarayana, Paul A. Fowler, and Leonardo Trasande

Male Reproductive Disorders, Diseases, and Costs of Exposure to Endocrine-Disrupting Chemicals in the European Union

Russ Hauser, Niels E. Skakkebaek, Ulla Hass, Jorma Toppari, Anders Juul, Anna Maria Andersson, Andreas Kortenkamp, Jerrold J. Heindel, and Leonardo Trasande*

Obesity, Diabetes, and Associated Costs of Exposure to Endocrine-Disrupting Chemicals in the European Union

Juliette Legler, Tony Fletcher, Eva Govarts, Miquel Porta, Bruce Blumberg, Jerrold J. Heindel, and Leonardo Trasande

Neurobehavioral Deficits, Diseases, and Associated Costs of Exposure to Endocrine-Disrupting Chemicals in the European Union

Martine Bellanger, Barbara Demeneix, Philippe Grandjean, R. Thomas Zoeller, and Leonardo Trasande

Disease burden of EDC.

Journal Clin Endocronol Metab 2015

Actionable studies

2015

Science of the Total Environment 517 (2015) 125–131

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Developing an intervention strategy to reduce phthalate exposure in Taiwanese girls

Chung-Yu Chen [a], Yen-Yin Chou [b], Shio-Jean Lin [b], Ching-Chang Lee [a,c,*]

2014

OPEN ACCESS Freely available online

PLOS ONE

Suboptimal Vitamin D Status in a Population-Based Study of Asian Children: Prevalence and Relation to Allergic Diseases and Atopy

Tsung-Chieh Yao[1,2*], Yu-Ling Tu[1,2,3], Su-Wei Chang[4], Hui-Ju Tsai[5,6,7], Po-Wen Gu[8], Hsian-Chen Ning[8], Man-Chin Hua[2,9], Sui-Ling Liao[2,9], Ming-Han Tsai[2,9], Chih-Yung Chiu[2,9], Shen-Hao Lai[2,10], Kuo-Wei Yeh[1,2], Jing-Long Huang[1,2*] and for the PATCH study group[¶]

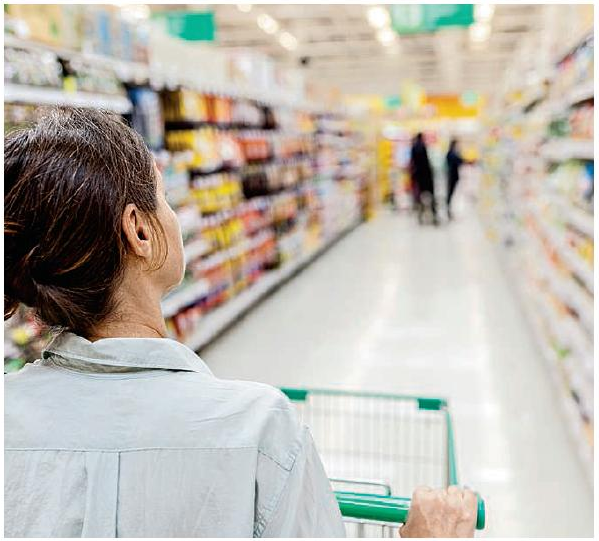
Social consciousness? Governmental regulation ?

EDITORIAL *Science Magazine 2015*

Arlene Blum is founder and executive director of the Green Science Policy Institute, Berkeley, CA. E-mail: arlene@GreenSciencePolicy.org

Tackling toxics

In reality, little toxicity information or regulation is required for 80,000 industrial chemicals used in commerce in the United States.



"Do we need this chemical, given the potential for harm?"

The Economist *1843*

THE BIG QUESTION

WHAT IN TODAY'S WORLD WILL APPAL OUR GRANDCHILDREN?

Eight writers look 50 years into the future

MAY/JUNE 2015

HENRY MARSH THE WAY OUR LIVES END

BEE WILSON OUR SUGAR HABIT

ROBERT BUTLER OUR RESPONSE TO CLIMATE CHANGE

ALLISON PEARSON OUR CHILD-CARE ARRANGEMENTS

經濟成長　　永續發展

Time to leave GDP behind

Gross domestic product is a misleading measure of national success. Countries should act now to embrace new metrics, urge **Robert Costanza** and colleagues.

Nature 2014

婦幼醫學的任務：
透過跨學門合作，確保社會永續發展

知識是叫人自高自大，唯有愛心能造就人。

哥林多人前書 第八章第1節

Acknowledgement

- 郭育良
- 李俊璋
- 王淑麗
- 許昺奇
- 黃柏菁