

Tobacco Exposure and Its Implications in Reproductive Health Outcomes

Ayman El-Mohandes, MBBCh, MD, MPH

For The NIH-DC Initiative to Reduce
Infant Mortality

Tobacco Kills *1 in 2* Long-Term Users

- Tobacco is the second leading cause of death globally after high blood pressure
- Tobacco consumption has remained stable in the industrialized world between the years 1970 and 2000
- During that same time period, tobacco consumption has tripled in the developing world

In The Next 25 Years

- Cigarette consumption will increase by 60% in countries with medium-level economic development
- Cigarette consumption will increase by 100% in countries with low-level of development. **Populations in these countries will consume more tobacco than any other countries globally**

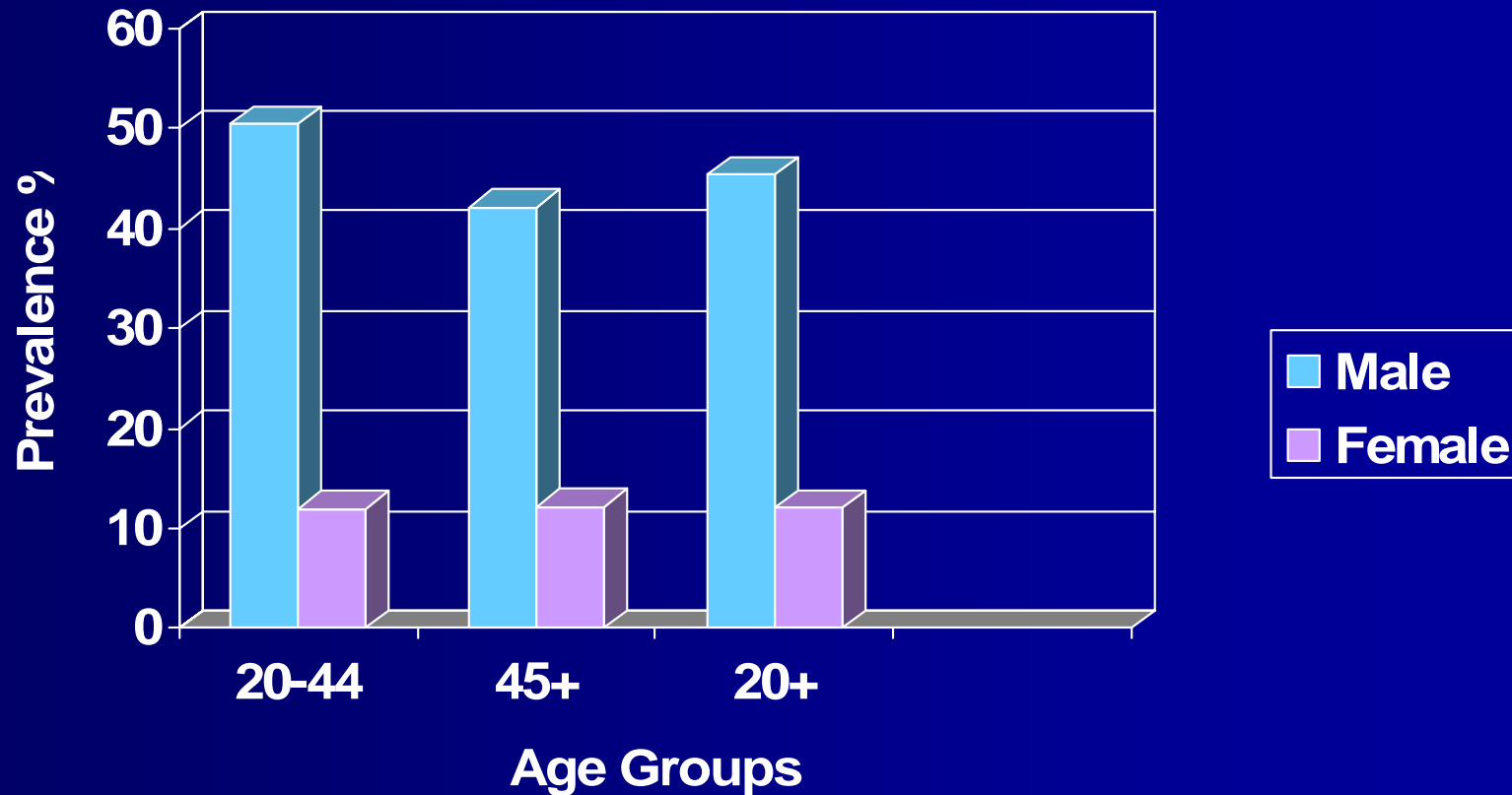
- Studies around the world have confirmed that liberalization of trade is associated with increased tobacco consumption, especially in low and middle income countries

Impact of Tobacco in the Developing World

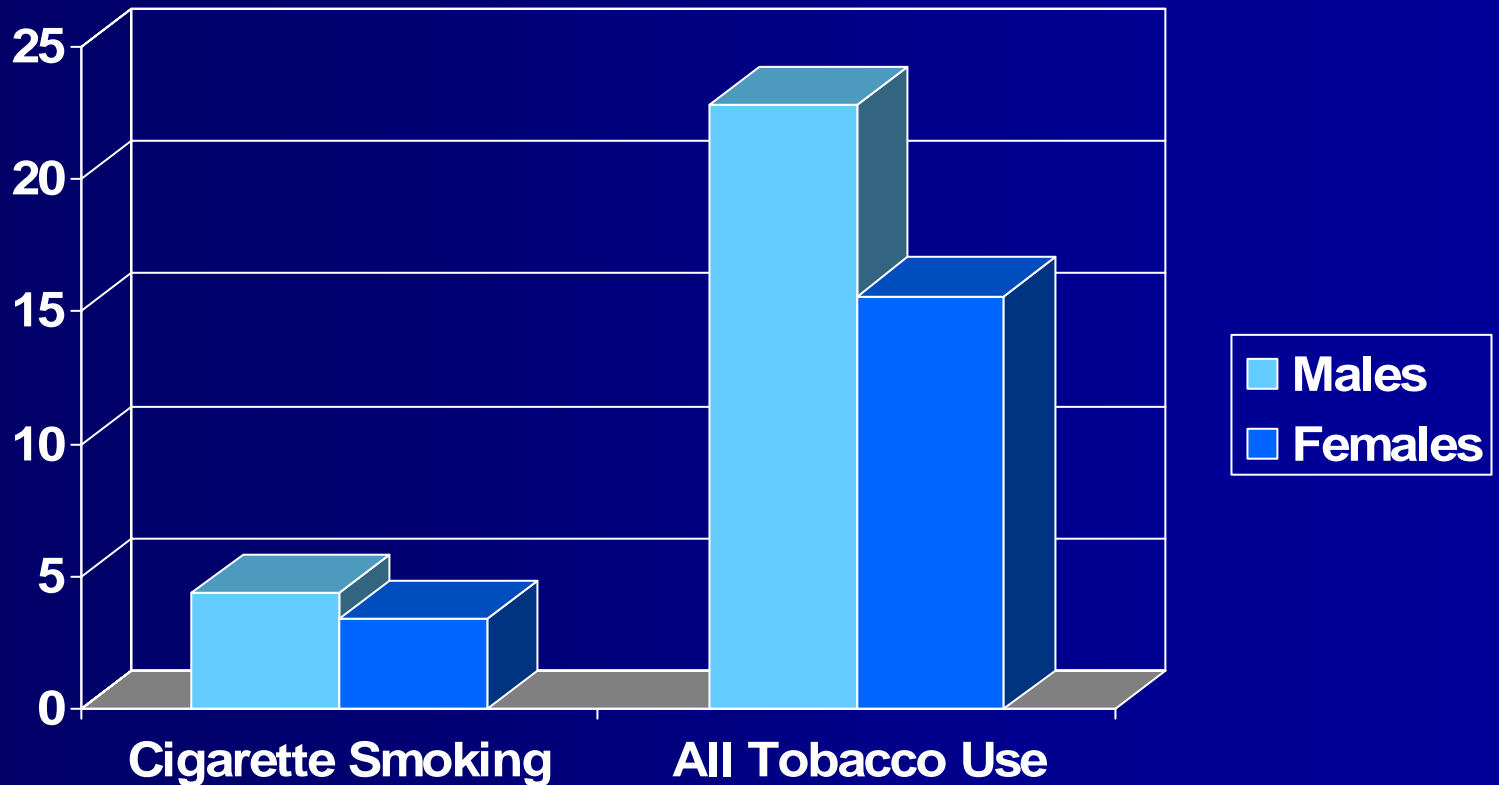
- 100 million deaths were attributed to tobacco in the 20th century, mostly in developing countries
- 1 billion deaths due to tobacco are expected this century, mostly in developing countries

- Smoking rates in the developing world are much lower in females in comparison to males
- This trend is changing as seen in prevalence of tobacco use amongst early teens in the same countries
- Egypt is an example...

Adult Tobacco Use Prevalence (%) in Egypt 1994



Adolescent Tobacco Use (%) in Egypt 2001



Tobacco Use Among Health Professionals in Egypt 2003

- 3384 health professionals completed a tobacco consumption survey
 - 85% physicians
 - 10% dentists
 - 5% nurses
- 71% of respondents stated they never smoked
- 15% were current smokers
- 14% had quit successfully

Impact of Environmental Tobacco Smoke Exposure

- The health risks to women and children in Egypt today from environmental tobacco smoke exposure (ETSE) far exceeds that from smoking

Some Chemical Toxicants Inhaled in 300 m² in an 8-Hour Workshift

Chemical	Amount (µg)
Carbon monoxide	5606
Tar	3128
Nicotine	678
Acetaldehyde	207
Nitric oxide	190
Isoprene	151
Resorcinol	123
Acetone	121
Toluene	66
Formaldehyde	54

Chemical	Amount (µg)
Phenol	44
Acrolein	40
Benzene	36
Pyridine	33
1,3-butadiene	25
Benzo[a]pyrene	18
Hydrogen Cyanide	14
Chromium	7.1
Lead	6.0
4-aminonaphthalene	5.2

Known carcinogens listed in red. Abstracted from a factsheet produced by Physicians for a Smoke Free Canada

ETSE and Children

- A study in Alexandria compared 60 children (0 to 10 years) exposed to ETSE to 20 controls
- Significant elevations were shown in their Cotinine levels, especially in the 0 to 2 age group
- Cotinine levels were higher in females ages 2 to 10

ETSE During Pregnancy in Egypt

Cotinine Levels in Neonate Meconium in Relation to Maternal Smoking Habit

Smoking Group	Meconium Cotinine Level (ng/ mL)		
	Range	Mean	SD
Active Smokers (n=10)	232-700	367.2	143.7
Passive Smokers (n=10)	148-350	263.4	52.5
Non-Smokers (n=10)	153-213	185.0	24.2
F-test	F = 10.45, P = 0.01		

Sherif, N et al. (2004), "Detection of cotinine in neonate meconium as a marker for nicotine exposure in utero"; Eastern Mediterranean Health Journal vol. 10:96-105

ETSE During Pregnancy in Egypt

Mean Difference in Birth Weight in Relation to Maternal Smoking Habit

Groups Compared	Difference in Birth Weight (g)		P-value
	Mean	Standard Error	
Active (n=10) vs. Passive (n=10) Smokers	-200.0	82.5	0.07
Active (n=10) vs. Non-Smokers (n=10)	-490.0	82.5	<0.001
Passive (n=10) vs. Non-smokers (n=10)	-290.0	82.5	0.006

NIH-DC Initiative to Reduce Infant Mortality in Minority Populations

- **Purpose:** reduce Washington DC infant mortality through cooperative community-based research
- **Collaborators:**
 - Howard University
 - Children's National Medical Center
 - Georgetown University Medical Center
 - George Washington University SPHHS
 - NICHD
 - RTI

Background

- **Elevated IMR in African Americans more than twice that for Caucasians**
- **Medical risks not fully explanatory**
- **Behavioral/psychosocial factors may affect pregnancy outcomes**
- **Little intervention research to date**

Study Objective

To evaluate efficacy of an **integrated counseling intervention** on selected behavioral-psychosocial risks in pregnancy and the postpartum (PP) period.

- **Smoking**
- **Passive smoking (ETS exposure)**
- **Depression**
- **Intimate partner violence (IPV)**

Study Objective

This presentation will address one component of the overall study

The efficacy of the integrated behavioral intervention in reducing reproductive morbidity in African American mothers who reported ETSE during pregnancy

Methods: Design

- **Block randomized trial**
- **Two phase consent and enrollment**
 - **Brief eligibility screen**
 - **Baseline interview prior to randomization**
- **Follow up telephone interviews**
 - **Trimester 2 (22-24 weeks)**
 - **Trimester 3 (34-38 weeks)**
 - **Postpartum (8-10 weeks)**

Methods: Intervention

- **Theoretically grounded**
 - **SOC for smoking**
 - **CBT for depression, IPV**
- **Individual sessions at PNC site**
- **“Homework” and behavioral monitoring**
- **8 sessions planned**
- **4 sessions as minimum**

Methods: Eligibility

- **Minority women**
- **≥ 18 years old**
- **PNC in DC 7/2001-10/2003**
- **≤ 28 weeks gestation**
- **Reporting ETSE**
 - “ anyone you live with or any visitors smoke cigarettes in your home”
 - “Times you are in the same room or in the car with someone smoking a cigarette”

Sample Size

- **Assuming a 5% level of significance, 80% power, sample size calculations indicated the need for 1,050 (525 in each of the care group). This number would allow detection of 10-20% reductions in behavioral risk and 25% reductions in prematurity and low birthweight in the intervention group.**

Methods: Statistical Analyses

- **Standard quality control measures**
- **Pre-specified hypotheses: decrease rates of miscarriage and preterm birth in the intervention group**
- **T-test analysis for differences between intervention and usual care groups with respect to specified outcomes**

Recruitment and Retention

- **2913** mothers screened for eligibility
- **871** eligible AAs mothers ETSE
- **Mothers were randomized and analyzed**
 - **430** intervention (I); **441** usual care (UC)
- **22%** in I and **19%** in UC admitted to smoking during pregnancy.

Socio-demographic Characteristics

	Intervention (N=430)	Usual Care (N=441)	P-value
Maternal Age	24.2 _± 5.4	24.6 _± 5.3	0.39
Education <HS	80.9%	77.8%	0.25
Employment	33.3%	36.7%	0.28
Married/living with Partner	25.6%	23.6%	0.49
Medicaid	92.7%	90.7%	0.31

Medical Risk

	Intervention	Usual Care	P-value
Early PNC	61.2%	57%	0.22
Multiple Preg.	1.4%	1.7%	0.82
Hypertension	3.3%	4.7%	0.34
Diabetes	6.0%	6.2%	0.93
Previous Prem. Delivery	14.8%	13.1%	0.48

Psycho-behavioral Risks

	Intervention	Usual Care	P-value
Alcohol use	21.0%	21.5%	0.84
Drug use	20.0%	17.9%	0.43
Depression BL	44.0%	42.0%	0.55
IPV (victim) BL	32.1%	31.5%	0.86
ETS BL	77.1%	78.2%	0.72

Pregnancy Outcomes

	Intervention	Usual Care	P-value
Miscarriage	1.3%	3.1%	0.11
Preterm <37 wk	12.6%	14.2%	0.53
V. Preterm <34 wk	2.0%	5.4%	0.02
LBW <2500 gm	12.2%	14.1%	0.45
VLBW <1500 gm	0.6%	2.8%	0.02

- When comparing the intervention group participants who attended at least one intervention session (81.5%) the differences between groups was even more significant.

Pregnancy Outcomes

	Intervention (n=350)	Usual Care (n=441)	P-value
Live Birth	98.5%	94.9%	0.01
Miscarriage	0.0%	3.1%	0.001
Preterm <37 wks	12.7%	14.2%	0.56
Preterm <34 wks	1.6%	5.4%	0.01
LBW <2500 gm	11.8%	14.1%	0.37
VLBW <1500 gm	0.33%	2.8%	0.01

Conclusions

- Women with history of ETSE in pregnancy are at increased risk:
 - Active smoking in pregnancy (21%)
 - Psycho-behavioral risks; IPV (32%), depression (44%), alcohol use (21%), and illicit drug use (20%)

Conclusions

- Women with history of ETSE in pregnancy have better pregnancy outcomes after receiving an integrated behavioral intervention addressing psycho-behavioral risks.

Conclusions

- Improved rates of live births seen when comparing only those receiving intervention sessions (I^*) to UC.
- Improved miscarriage rates in I^* are significant albeit surprising due to the short interval after recruitment.
- No significant reduction of the preterm births (<37 wk) were detected but significance is evident in the more severe strata of prematurity.
- A similar trend is seen in LBW.