

Human Population 2018

Lecture 24
family planning

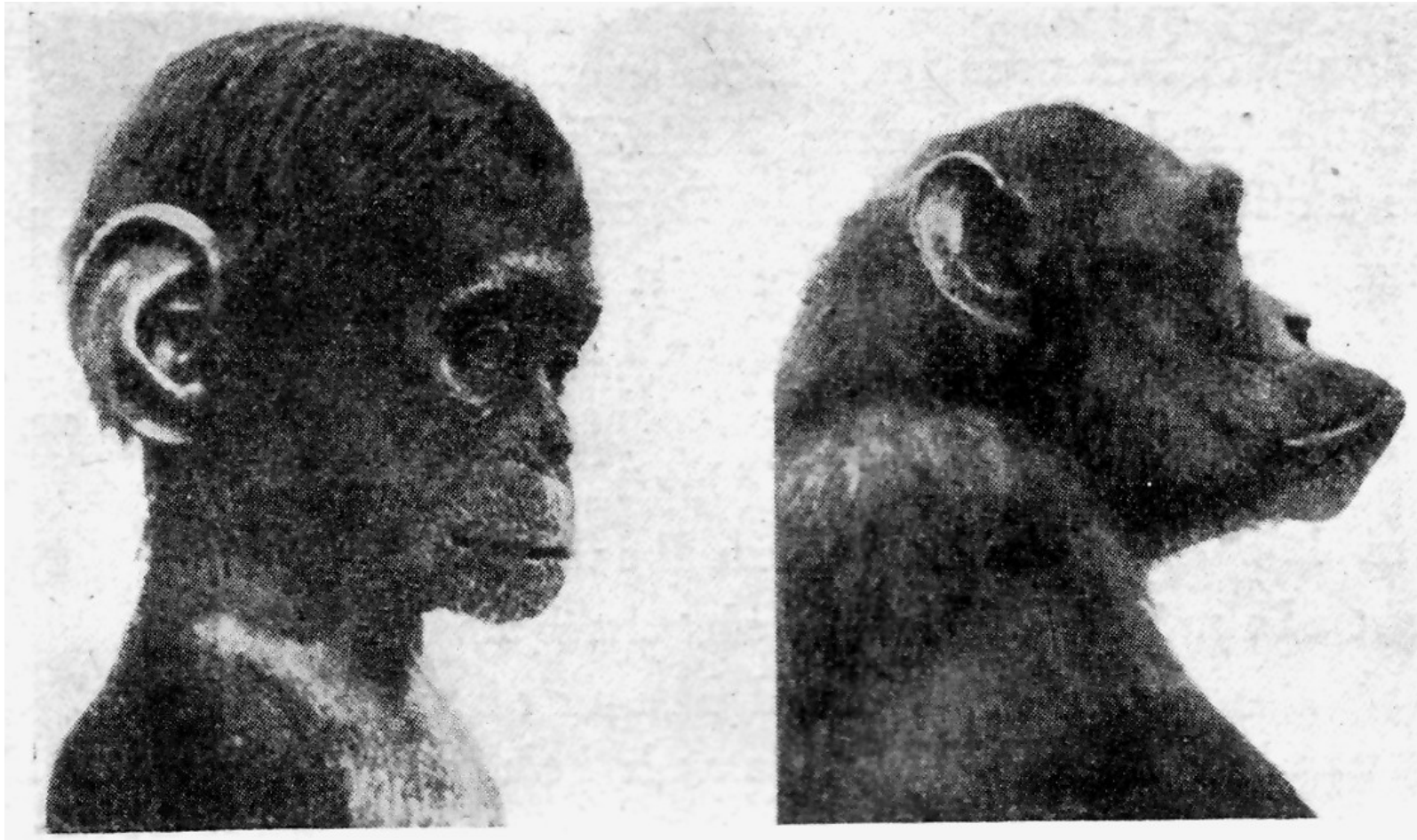
7-minute science

Questions

One day, a mutation...

ACGGT**G**CATA
ACGGT**A**CATA

...caused neoteny...



...which was good news and bad news. We are smarter.



...but we are basically helpless
for our first years of life.



Babies can't go on hunts



They scare the prey.

...and you can't leave them home...



...so mom stays home.

Baby and mother need to eat, requiring
a provider...



...requiring "rewards"
for the provider.



...made more effective by
mutual rewards



...leading to more sexual activity, thus more babies...



...leading to starvation...



...leading to...



...birth control.

Early methods of birth control

- Taboos, abstinence
- Herbs
- Infanticide
- Rituals

Modern Methods:

Barrier Methods



compare

Male Condom

What is it? A thin covering that you unroll over the hard penis. Made of

[read more](#) ▼



compare

Female Condom

What is it? A soft, loose pouch that you put inside your vagina. Flexible

[read more](#) ▼



compare

Spermicide

What is it? Spermicidal chemical comes in several forms; you can choose

[read more](#) ▼



compare

Diaphragm

What is it? A soft silicone dome with a flexible rim that holds spermicide.

[read more](#) ▼



compare

Cervical Cap

What is it? A small, soft silicone cup holding spermicide. Designed to fit

[read more](#) ▼

Barrier methods

- Requires planning ahead.
- Last minute application.
- May fail.

Knowledge Based Methods



compare

Withdrawal (Pulling Out)

What is it? The man takes his penis out of his partner's vagina before

[read more](#) ▼



compare

Fertility Awareness

What is it? When you understand your fertile time (days you can get

[read more](#) ▼



compare

Breastfeeding (Lactation Amenorrhea)

What is it? Breastfeeding stops egg development if the following three

[read more](#) ▼



compare

Sex Without Intercourse

What is it? You can experience intimacy, closeness, pleasure and orgasms

[read more](#) ▼

Knowledge-based

- Always available.
- Free.
- Not fool-proof.

Long Term Methods



[compare](#)

Implant

What is it? A soft rod 1½ inches long that is placed under the skin in

[read more](#) ▼



[compare](#)

IUD Progesterone

What is it? Intra-Uterine Device shaped like a small plastic T with a

[read more](#) ▼



[compare](#)

IUD Copper

What is it? Intra-Uterine Device shaped like a small plastic T wrapped in

[read more](#) ▼



[compare](#)

Sterilization

What is it? For Females, the fallopian tubes are blocked or cut, either

[read more](#) ▼

Long-term

- Not free.
- Almost fool-proof.
- No actions needed.

Hormonal Methods

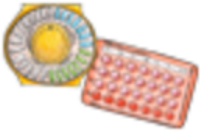


compare

Emergency Contraception

What is it? A pill or combination of pills you take after sex to prevent

[read more](#) ▼



compare

The Pill

What is it? A pill containing synthetic hormones you take orally every day

[read more](#) ▼



compare

The Patch

What is it? A bandage-like patch that sticks to your skin. Hormones are

[read more](#) ▼



compare

Vaginal Ring

What is it? A clear, soft, flexible 2-inch circle worn in vagina. Your

[read more](#) ▼



compare

The Shot

What is it? A long-acting injection of synthetic progestin hormone.

[read more](#) ▼

Hormonal

- Not free.
- Not fool proof.
- Side effects.
- Very effective.

Birth control implant

Also called: Contraceptive implant



Availability

Clinic visit needed

Effectiveness

Over 99% effective

Effort

Lasts up to 4 years

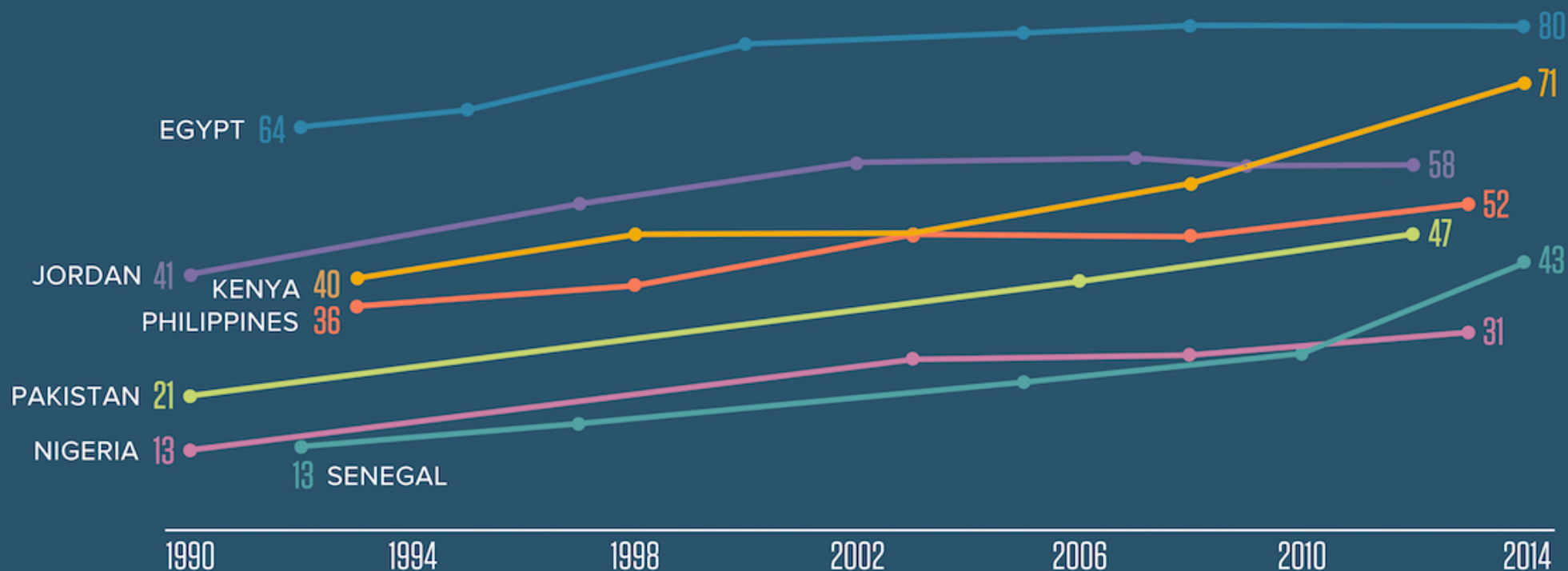
Overview

The implant is a very small rod inserted under the skin of a woman's upper arm to provide birth control. It's invisible and prevents pregnancy for up to 4 years.

Common brand: Nexplanon

Family Planning Needs Increasingly Met by Modern Methods, but More Progress Needed

Percent of Demand for Family Planning Satisfied by Modern Contraceptive Methods



NOTE: Data points are for each corresponding survey year.

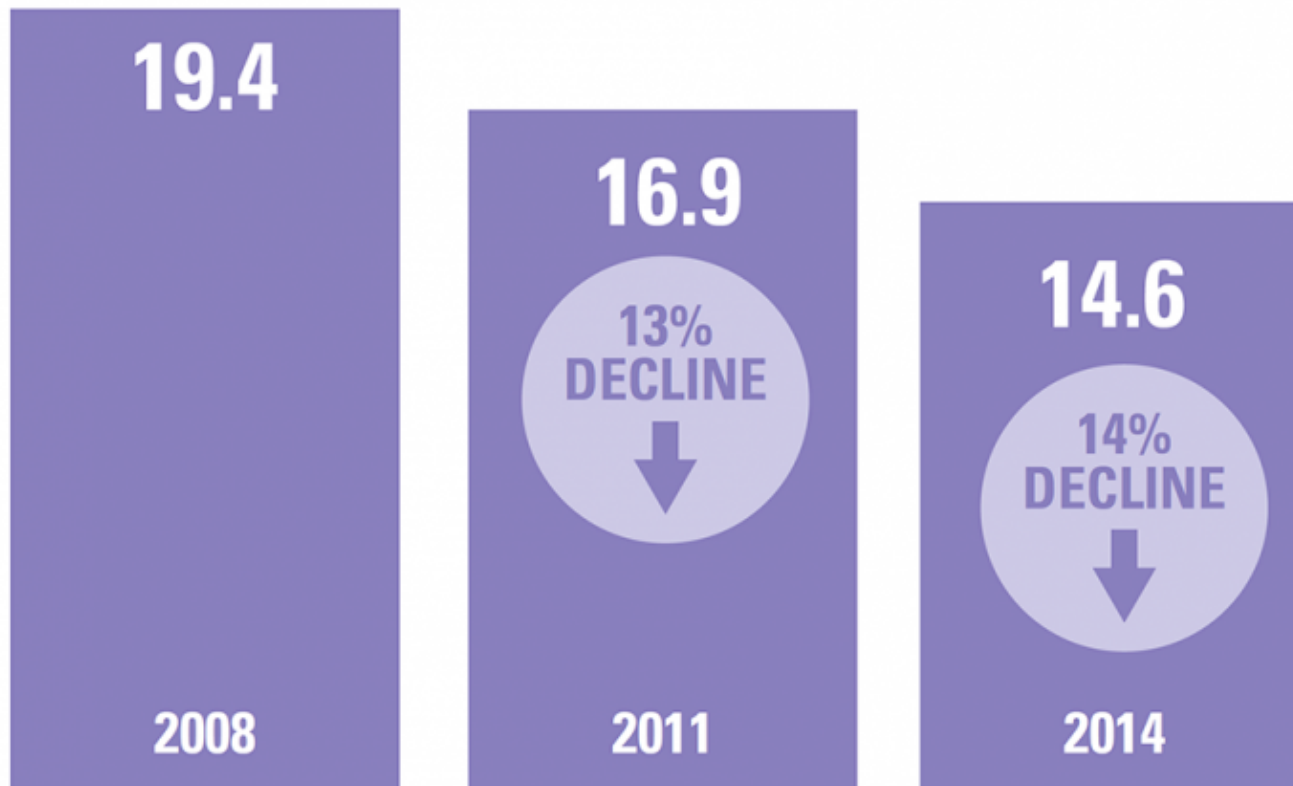
SOURCE: ICF International, Demographic and Health Surveys.

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Steady Drop

The U.S. abortion rate has declined significantly in recent years.

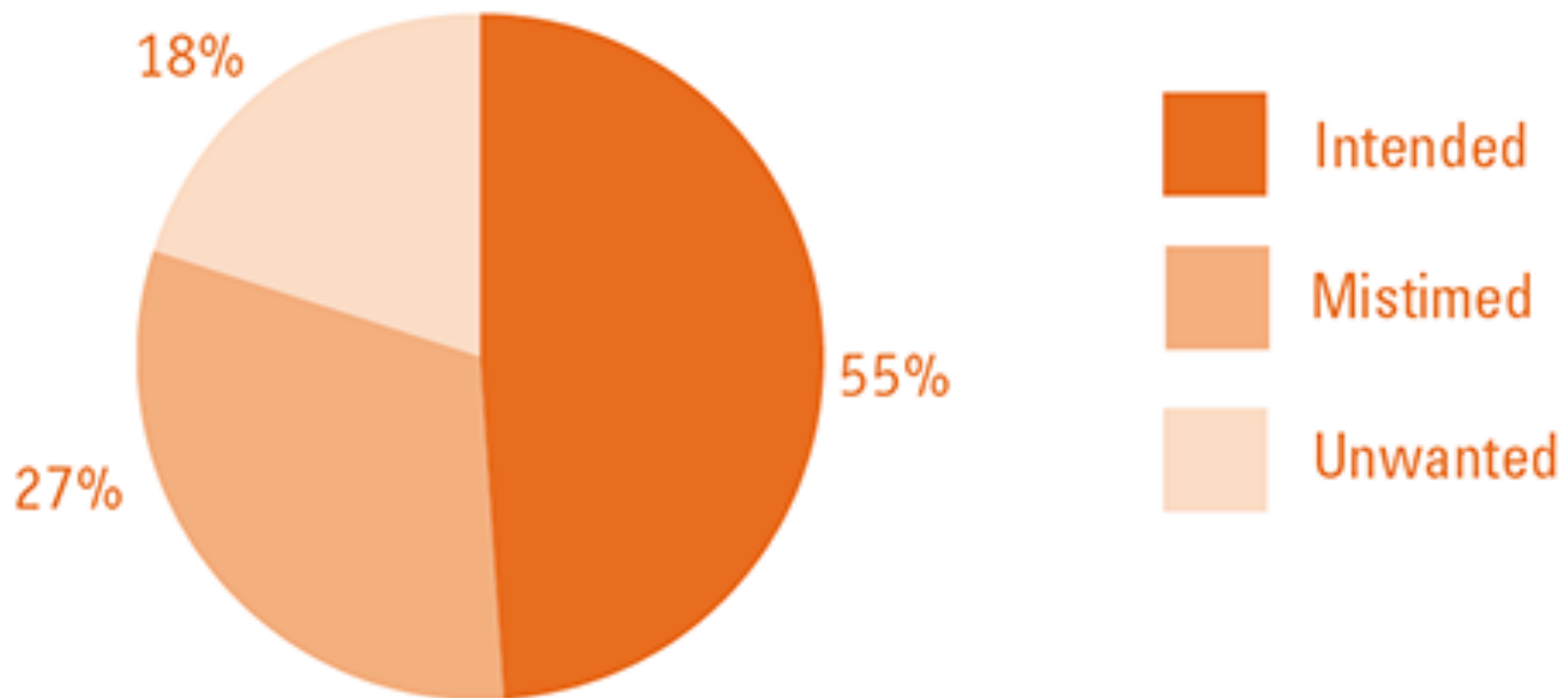
Abortions per 1,000 women aged 15–44



Source: Guttmacher Institute.

Pregnancies by Intention Status

Nearly half of U.S. pregnancies are unintended.



www.guttmacher.org

Can replacement value could be attained by **informed consent + perfect adherence?**

- 213 million pregnancies occurred in 2012
 - 85 million pregnancies, representing 40 percent of all pregnancies, were unintended (mistimed or unwanted).
 - Of these, 50% ended in abortion,
 - 13% ended in miscarriage, and
 - 38% resulted in an unplanned birth. (=32.3M)
 - 128 million pregnancies were intended.
 - Of these, 84% resulted in planned birth (=108M)
- Total births in 2012 was 140 million.
- Total deaths in 2012 was 56 million.
- Natural Increase = 84 million (= 1.2% growth rate)
- Hypothetical natural increase without unplanned births = 52 million.

Informed consent + perfect adherence could decrease growth rate from **1.2%** to **0.7%**

Sedgh, G., Singh, S. and Hussain, R., 2014. Intended and unintended pregnancies worldwide in 2012 and recent trends. *Studies in Family Planning*, 45(3), pp.301-314.

http://www.prb.org/pdf12/2012-population-data-sheet_eng.pdf

Imperfect adherence

unintended pregnancy

Annual medical costs of UP in the United States were estimated to be \$4.6 billion, and 53% of these were attributed to **imperfect contraceptive adherence**. If 10% of women aged 20–29 years switched from oral contraception to LARC, total costs would be reduced by \$288 million per year.

long-acting reversible contraceptive

Imperfect contraceptive adherence leads to substantial UP and high, avoidable costs. Improved uptake of LARC may generate health care cost savings by reducing contraceptive non-adherence.

Trussell J, Henry N, Hassan F, Prezioso A, Law A, Filonenko A. **Burden of unintended pregnancy in the United States: potential savings with increased use of long-acting reversible contraception.** *Contraception.* 2013 Feb 28;87(2):154–61.

teen pregnancy

"We found no evidence to indicate that existing interventions to reduce **repeat teenage pregnancy** were effective"

Whitaker, R., Hendry, M., Rabeea'h Aslam, A.B., Carter, B., Charles, J.M., Craine, N., Edwards, R.T., Noyes, J., Ntambwe, L.I., Pasterfield, D. and Rycroft-Malone, J., 2016.

Intervention Now to Eliminate Repeat Unintended Pregnancy in Teenagers (INTERUPT): a systematic review of intervention effectiveness and cost-effectiveness, and qualitative and realist synthesis of implementation factors and user engagement. Health technology assessment (Winchester, England), 20(16), p.1.

Estimated number of unintended
(unwanted) children = ~32 million/year

Total global population growth = ~84
million/year

Eliminating unwanted births would
cut population growth by 38%!

Decreased teen pregnancy means quality of life for young
women would be improved due to increased education.

Q:

How is having a child like
buying a refrigerator?

Some economists write about childbearing as though couples sat at the dining room table and worked out their mutual interest in having babies the way they might plan their investments or select a new refrigerator.²¹ Baby making is nothing like buying a refrigerator, however; it's more like the appliance retailer bringing you a new refrigerator every year or two unless you've taken effective and consistent steps on a nearly daily basis to make sure none is delivered. Sexual intercourse is an act of intimate shared pleasure that occurs "many hundreds or even thousands of times more frequently than is needed to achieve the desired number of pregnancies," as University of California population and health specialist Martha Campbell and colleagues have written.²² Rather than akin to ordering a refrigerator, more often the act includes steps—if nothing more than a prayer—to keep the delivery truck away from the door.

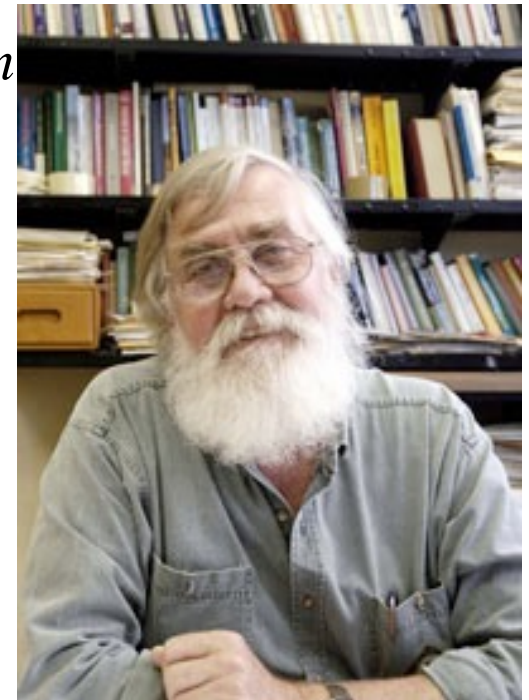
Can we make family planning more like "buying a refrigerator"?

Eric Pianka, Denton A. Cooley Centennial Professor of Zoology, UT Austin.

The "Johnny Anti-Appleseed Solution" for Overpopulation

"First...bless everyone with infertility.

1. Design a molecule that could that could bind DNA and make people sterile.
2. Design another molecule that would unmask the first and make the person fertile, just for a short time.
3. Make people work for the second pill*. You'd get responsible parenthood. No more unwanted children, no juvenile delinquents... "



Author of *The Vanishing Book of Life on Earth*

*Married couples only?

walking it back...

The Requirement of Informed Consent

	informed	not informed
consensual	ok	coerced
not consensual	forced	covert

- What would happen if contraception/sterilization was administered without **informed consent**? (just think a minute)
 - Examples:
 - Birth control in the drinking water.
 - Live, engineered, contagious, contraceptive virus.

Compulsory sterilization backfires

Indira Gandhi



India's state of emergency between 1975 and 1977 included a family planning initiative that began in April 1976 through which the government hoped to lower India's ever increasing population. This program used propaganda and monetary incentives to [deceive and coerce] citizens to get sterilized. People who agreed to get sterilized would receive land, housing, and money or loans.

S.No. ▲	Census Year ◆	Population [23] ◆	% Change [23] ◆
1	1951	361,088,000	-----
2	1961	439,235,000	21.6
3	1971	548,160,000	24.8
4	1981	683,329,000	24.7
5	1991	846,387,888	23.9
6	2001	1,028,737,436	21.5
7	2011	1,210,726,932	17.7

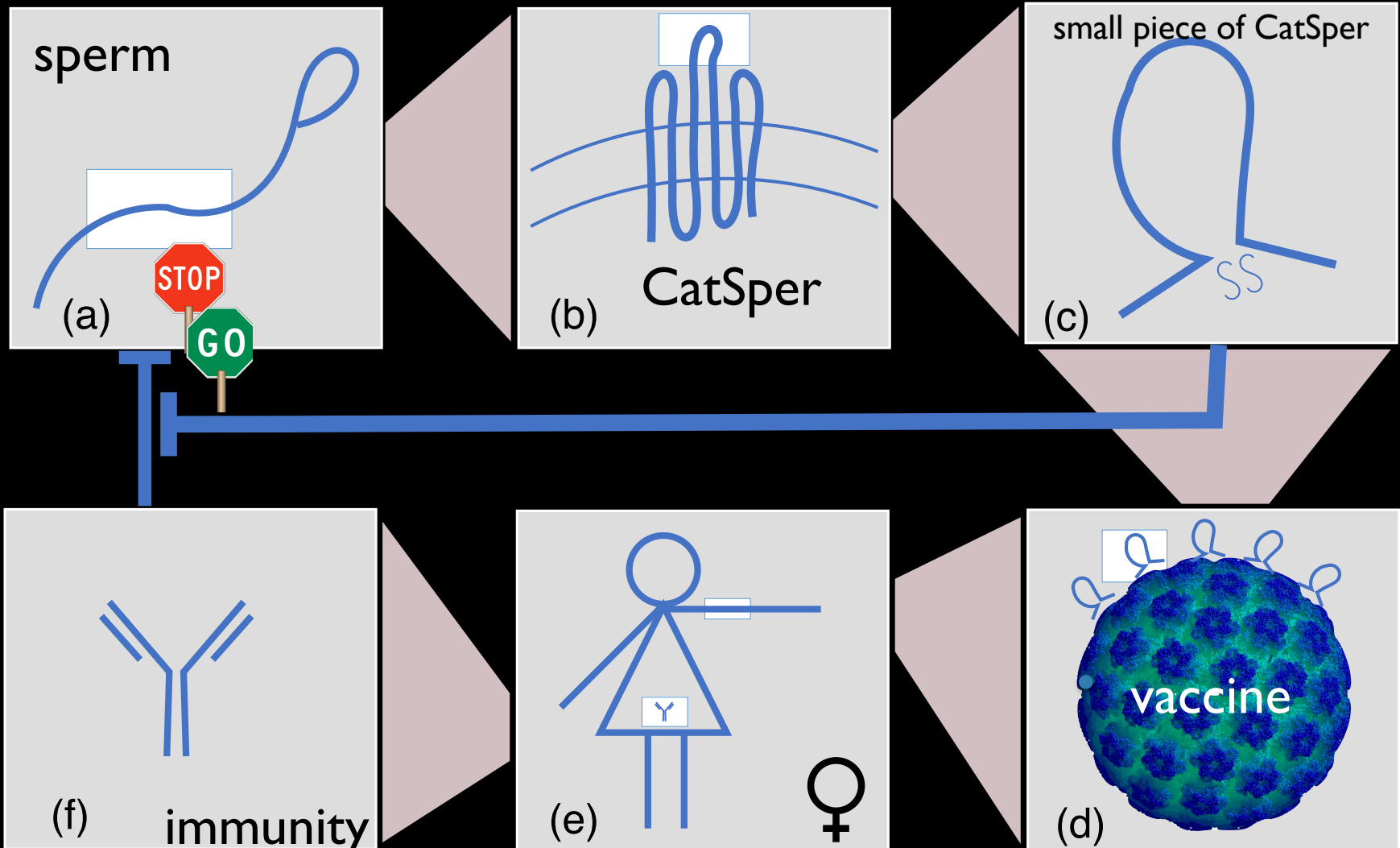
A strong backlash against any initiative associated with family planning followed the highly controversial program, which continues into the 21st century.[27]

Immune-based contraception?

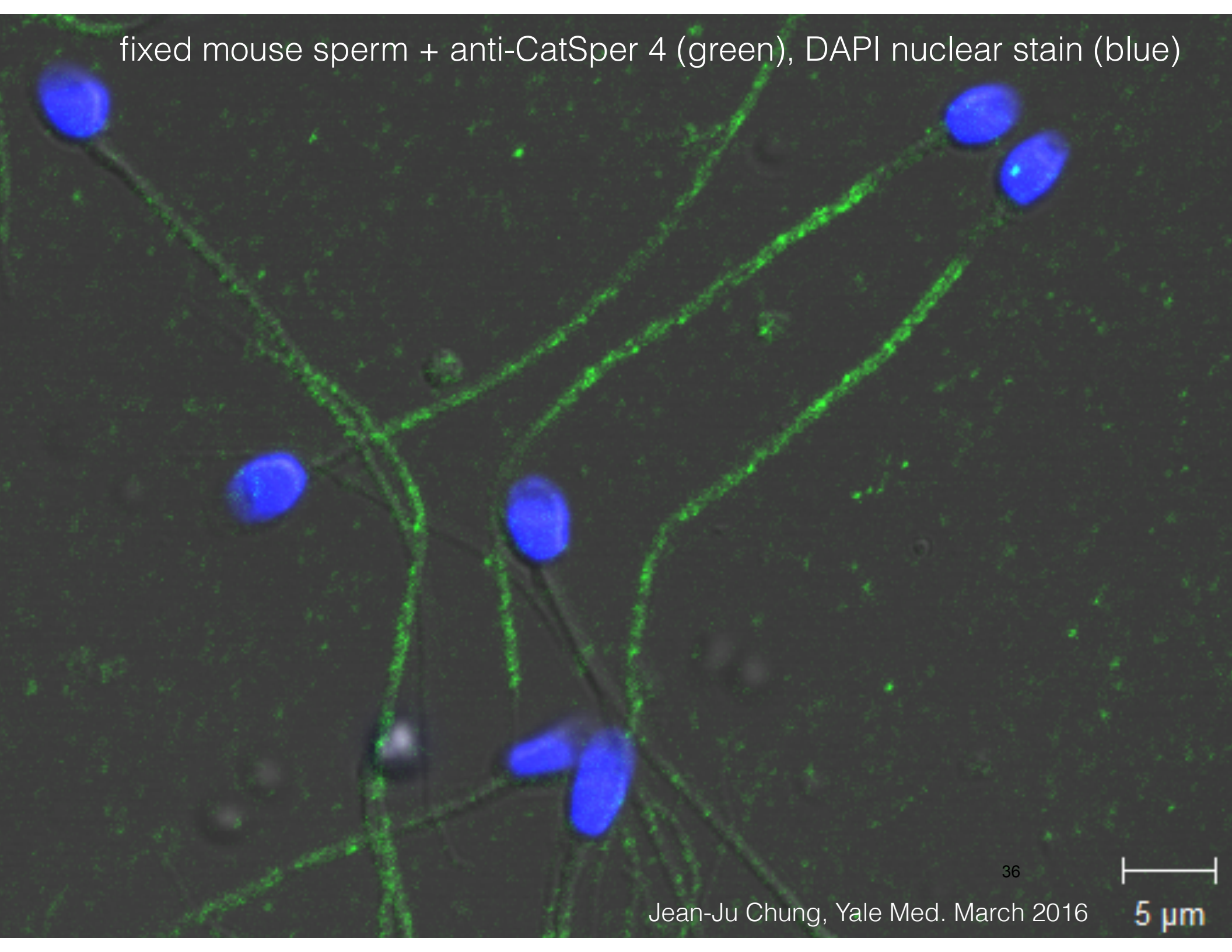
Safer.
Cheaper.
Reversible.
No action required.

Vaccination Targets

- **Gametogenesis** - testes or ovary proteins. Immune castration/spaying.
- **Fertilization** - Sperm proteins, egg proteins, signaling proteins
- **Implantation** - immuno-abortifacants



fixed mouse sperm + anti-CatSper 4 (green), DAPI nuclear stain (blue)



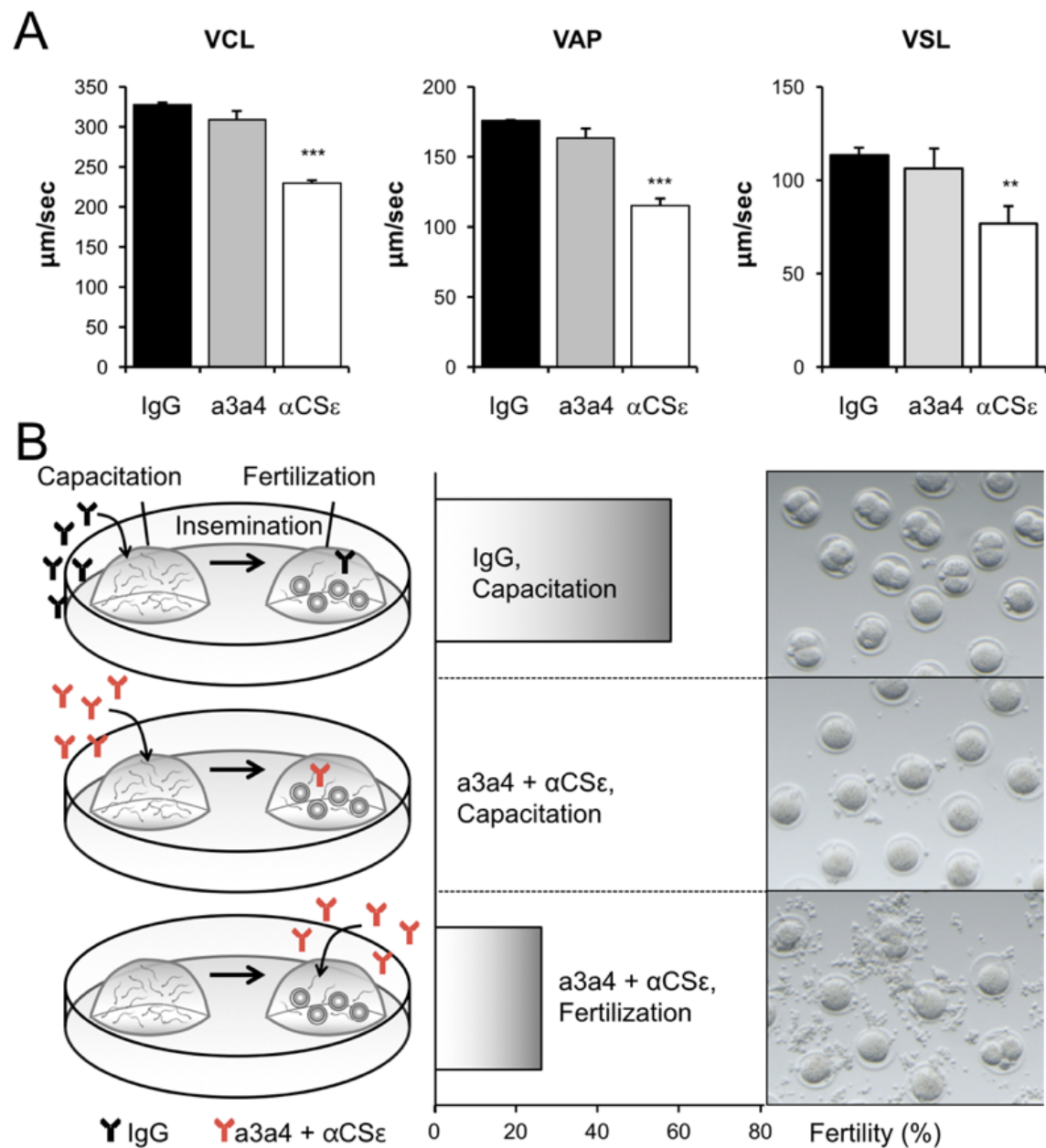
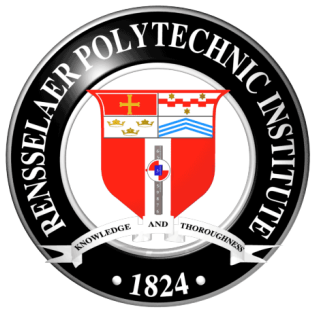


Figure 6. Inhibition of motility and fertility by CatSper antibodies against extracellular epitopes of CatSper 1 (a3a4) and epsilon (CSε). (A) Motility analysis of capacitated mouse sperm in the presence of 20 µg/ml antibodies by CASA. (B) *In vitro* fertilization performed with COC eggs. Antibodies are treated either during sperm capacitation or fertilization at 20 µg/ml (*unpublished*).

Other contraceptive vaccines that block fertilization

- Whole sperm
- Zona pellucida (ZP3) -- blocks egg/sperm reaction, causes degradation!
- Eppin -- blocks late sperm maturation step.
- YLP12 -- ZP mimic peptide



CatSper Project

Yale University



Planned Parenthood of Southern New England

CatSper Project MacArthur Team Members (proposal not funded)

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 Clair Kaplan, M.S.N., APRN, Planned Parenthood of Southern New England
 William Ryerson, Population Media Center



GM-099827

problem: lack of investment in research

Research opportunities in overpopulation? Not much,...

Total number of posted grant opportunities listed on Grants.gov which include the word X anywhere in the full announcement.

X

158

cancer

55

alzheimer

25

poverty

383

population

3

contraception

0

overpopulation

knee-jerk reactions



Vicky Donaldson

1 hr ago

Tanzania allows 14 year old females to marry with parental permission, otherwise females can marry at 15. For males marriage age is 18. Notice anything peculiar here ? Females do get pregnant from rape and incest too.

Like · Report



Chris Bystroff

58 mins ago

Someone should invent an immunocontraceptive!!

Like ·



Vicky Donaldson

53 mins ago

Oh dear. Accidentally fed a troll.

Like · Report



Chris Bystroff

0 secs ago

No! A scientist. That is my research. Look me up. I am googleable. I... [Read more](#)

Like ·



Write a reply...

Reply

Contraception taboo is alive and well

<http://nation.com.pk/editorials/16-Sep-2015/uncomfortable-truths>

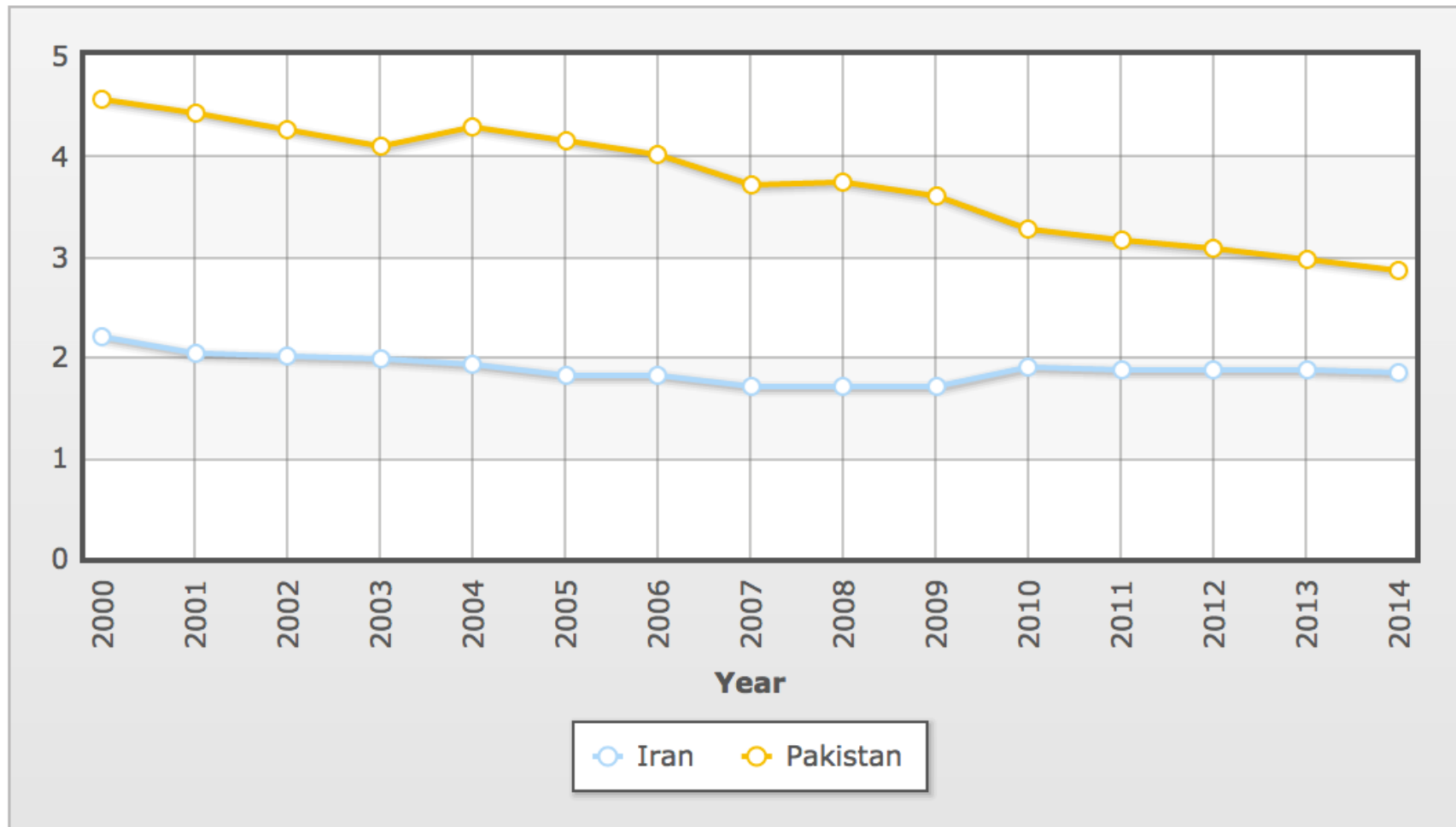
A US-based company aired a commercial for condoms in which a man is smiling and dancing after buying a large pack of condoms. Pakistan Electronic Media Regulatory Authority bans the commercial, calling it "an affront to Pakistani culture".



good news nonetheless, but slow.

Pakistan TFR high compared to Iran, but dropping

Total fertility rate (children born/woman)



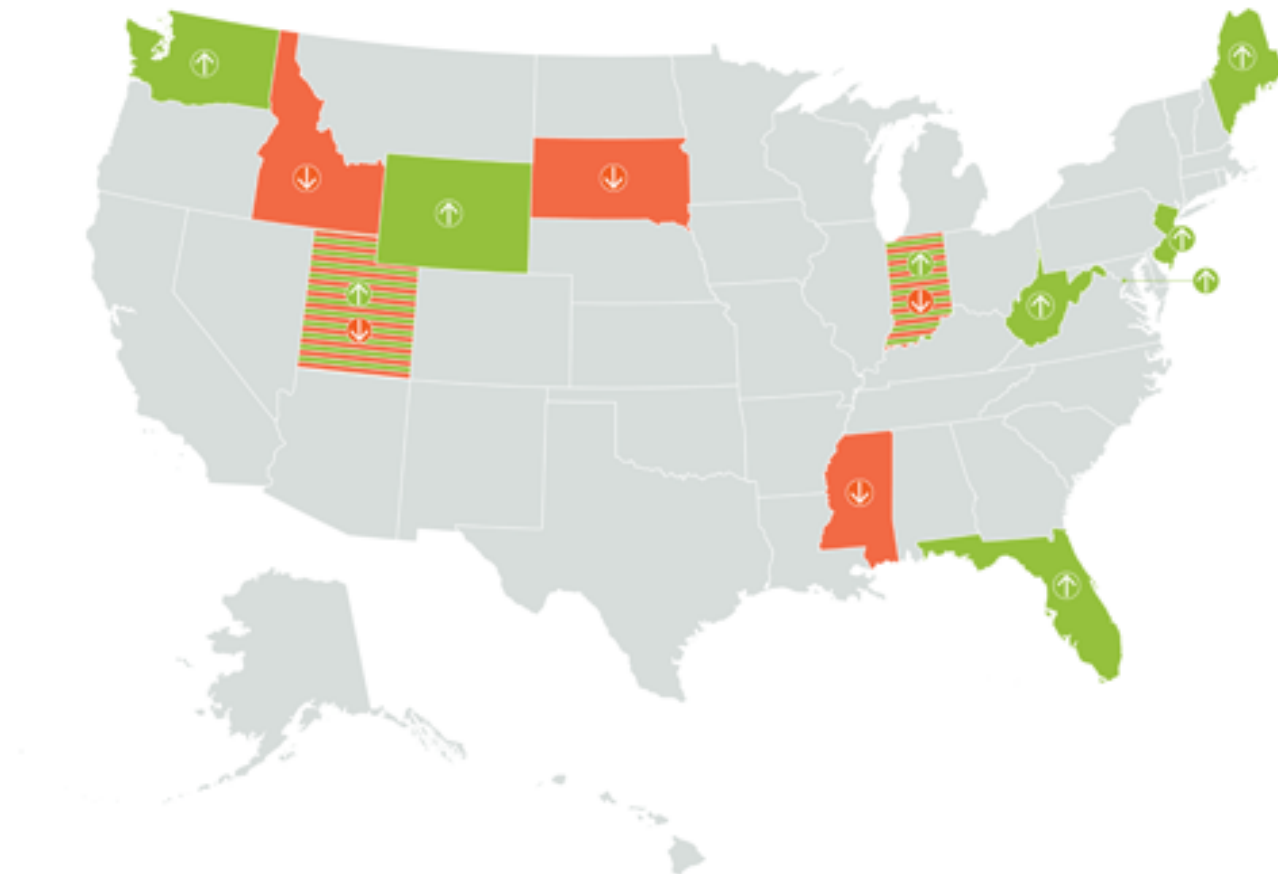
Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Iran	2.2	2.02	2.01	1.99	1.93	1.82	1.8	1.71	1.71	1.71	1.89	1.88			
Pakistan	4.56	4.41	4.25	4.1	4.29	4.14	4	3.71	3.73	3.6	3.28	3.17			

good news nonetheless, but slow.

GUTTMACHER INSTITUTE

More jurisdictions enacted positive legislation than restricted abortion access in the first quarter of 2018

■ Positive provision enacted ■ New abortion restriction enacted



Assignment for Tuesday Apr 24

- Listen to the radio news, watch TV news, read newspaper, news blogs.
- Make notes of any **mention** of population.
- Make notes of **failure to mention** population when it is clearly relevant to the news story.
- Enter your result (with link if possible) in the **Ask** window (select Lecture 25)

Work on projects

