Actuaries Summit

Think Differently

Actuaries Institute

21-23 May 2017 • Grand Hyatt Melbourne

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Data driven public policy: an actuarial journey in maternal health

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THE BEGINNING

Why maternal costs and adverse births?

"**Premature birth rates** are increasing in most countries and reflect the leading cause of death for newborns"
World Health Organisation, 2012

The **AIHW** in Australia reports…

9%
Rate of premature births in 2014

$3.4B
$'s spent by govt on maternal hospital costs in 2012/13

>90% are hospital costs…

the rest is largely out-of-hospital

Questions we will answer today

Quantify cost differentials

"Do women who have adverse births cost more than those who don't?"

Identify cost risk factors

(hospital & out of hospital)

"What are the drivers of maternal health costs?"

Inform maternal health policy

"How do we transform this into practical public policy?"

LUCY

Aged 36
Smoker
Diabetic
Lives Sydney
Married
Has private health insurance
…

Premature birth (caesarean delivery)

GRACE

Aged 23
Non smoker
Not diabetic
Lives Goulburn
Not married
No private health insurance
….

No adverse birth (vaginal delivery)

What are major events in the perinatal period?

Hospitalised during pregnancy

Baby born prematurely via caesarean delivery

Antenatal → Delivery → Postnatal

Diagnosed Pre-eclampsia

Diagnosed postnatal depression

Baby born healthy at term via vaginal delivery

Antenatal → Delivery → Postnatal

Diagnosed postnatal anxiety

THE MIDDLE

How do we model costs?

Data: Australian Longitudinal Study for Women's Health (ALSWH)

- For hospital study (1742 women in NSW only): ALSWH linked with NSW Admitted Patient's Data Collection (APDC), NSW Perinatal Data Collection (PDC) + others
- For out-of-hospital study (2520 women): ALSWH linked with Medicare Data

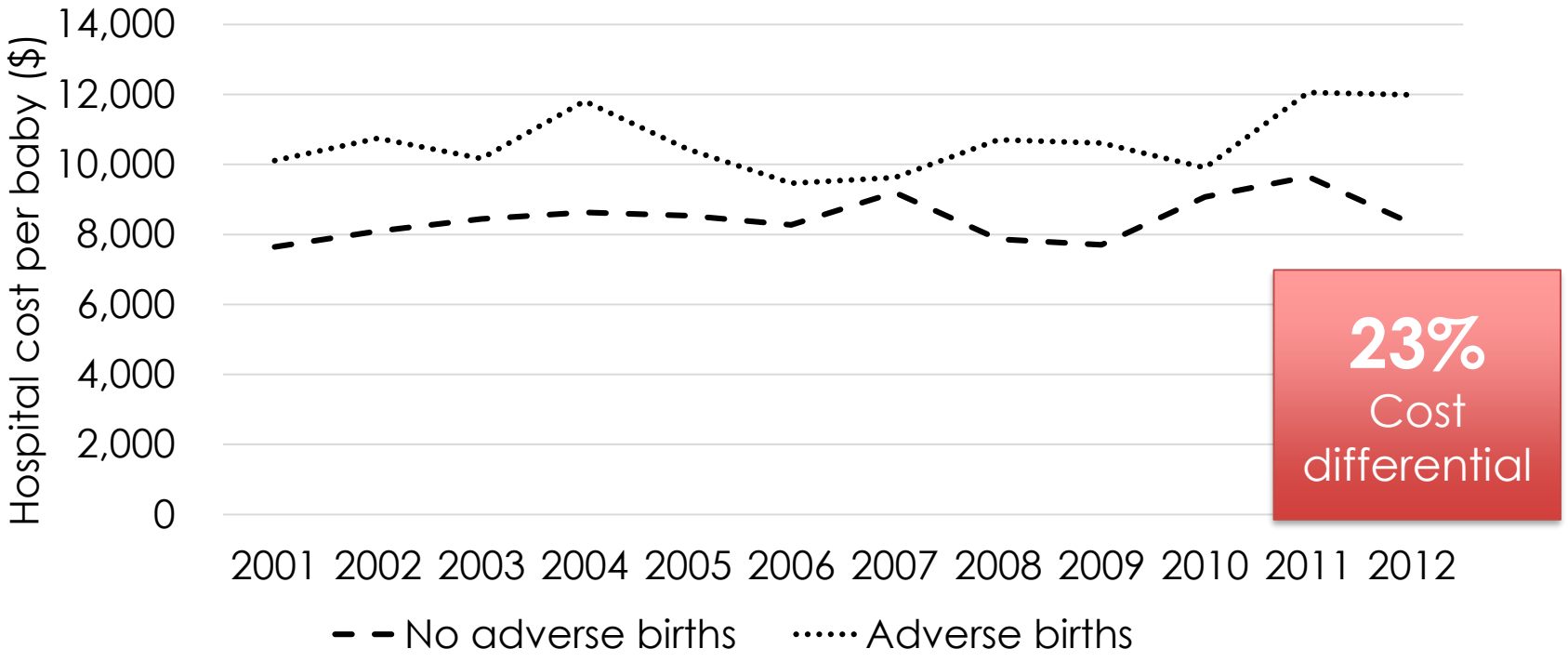
Statistical Methods

- Two phase modelling methodology:
  - Exploratory: Classification and Regression Trees (CART)
  - Parametric modelling: Generalised Linear Models (GLM's) & Generalised Linear Mixed Models (GLMM's)

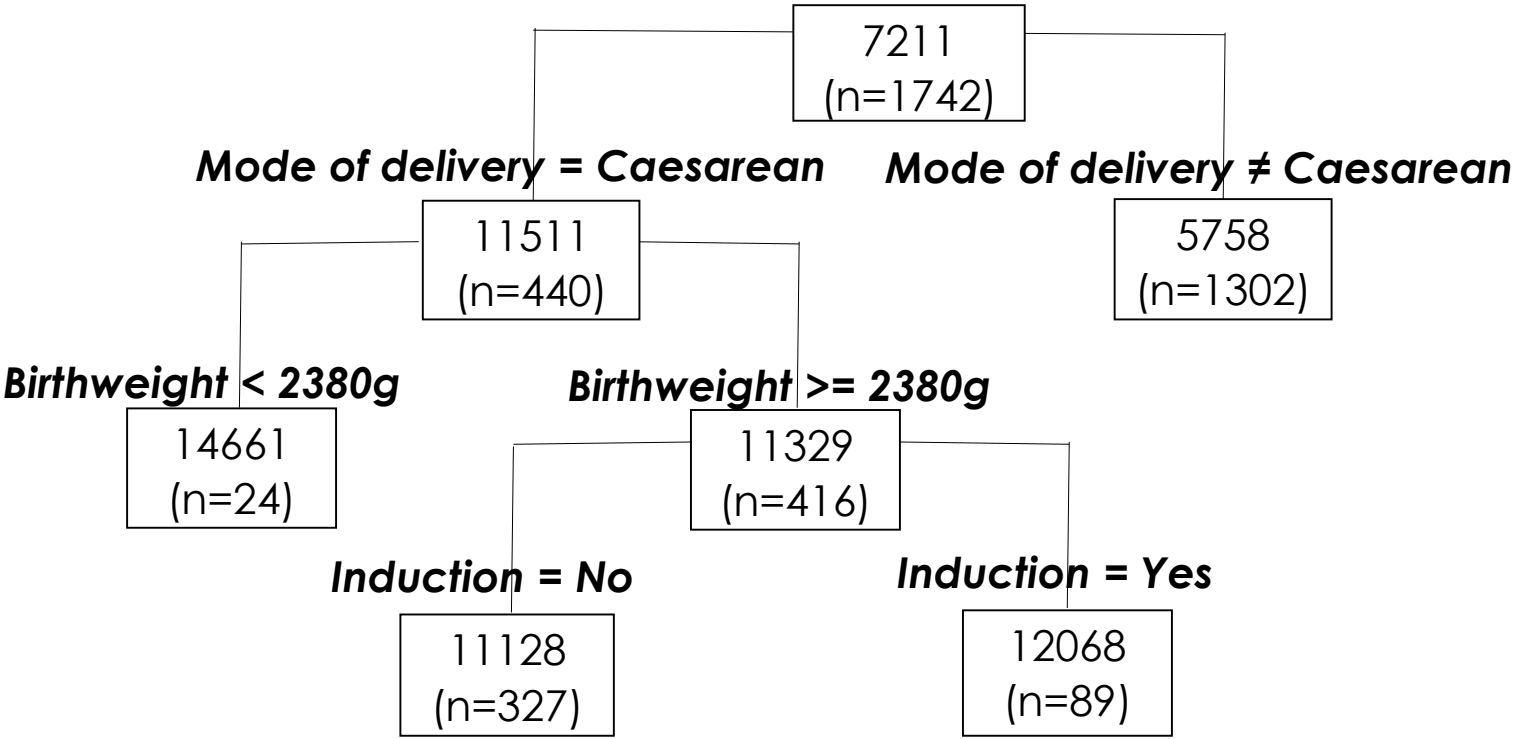
Results:
The hospital study

Hospital cost differential (all periods)

All costs inflated to December 2015



CART Delivery Period



Delivery period cost risk factors (GLM)

Lucy costs….250% more than Grace

LUCY

Aged 36
Smoker
Diabetic
Lives Sydney
Married
Has PHI
Premature baby
(caesarean delivery)

Lucy costs:

96% more than a woman who has a **vaginal delivery**

12% more than a woman who does not have **diabetes**

8% more than a woman who does not have an **adverse birth outcome**

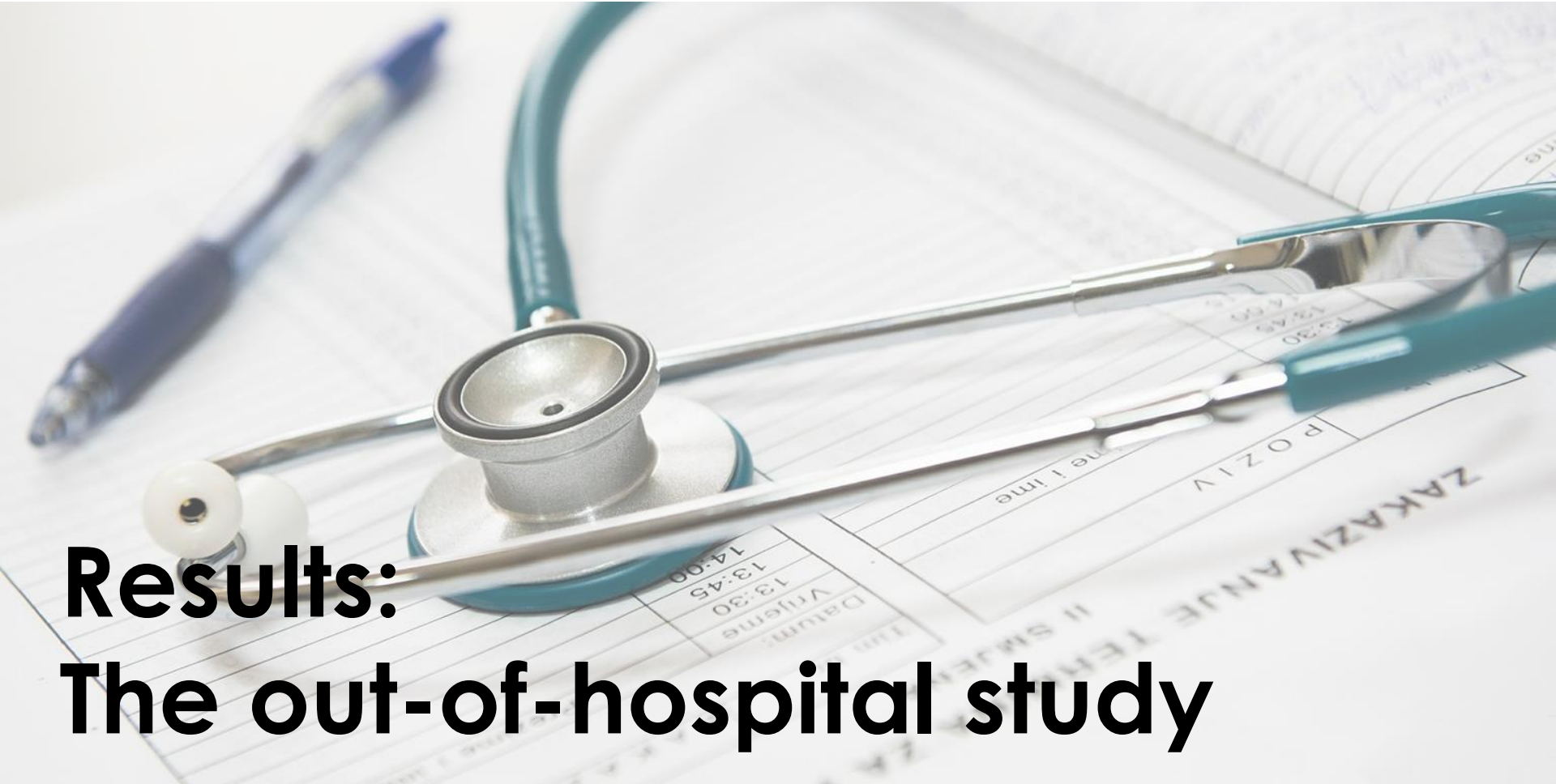
3% more than a woman who does not have **private health insurance**

1% more than a woman living in a **rural area**

1% more than a woman who does not **smoke**

GRACE

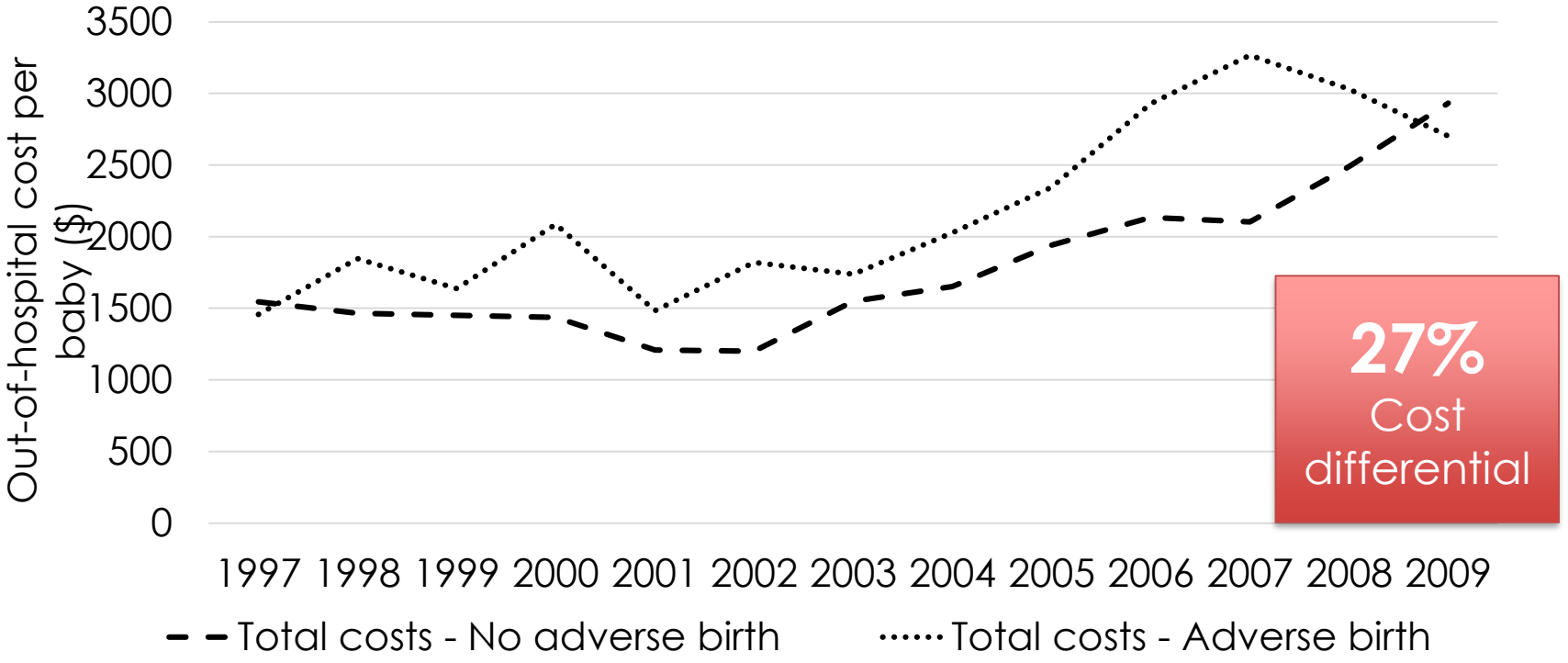
Aged 23
Non smoker
Not diabetic
Lives Goulburn
Not married
No PHI
No adverse birth
(vaginal delivery)



Results:
The out-of-hospital study

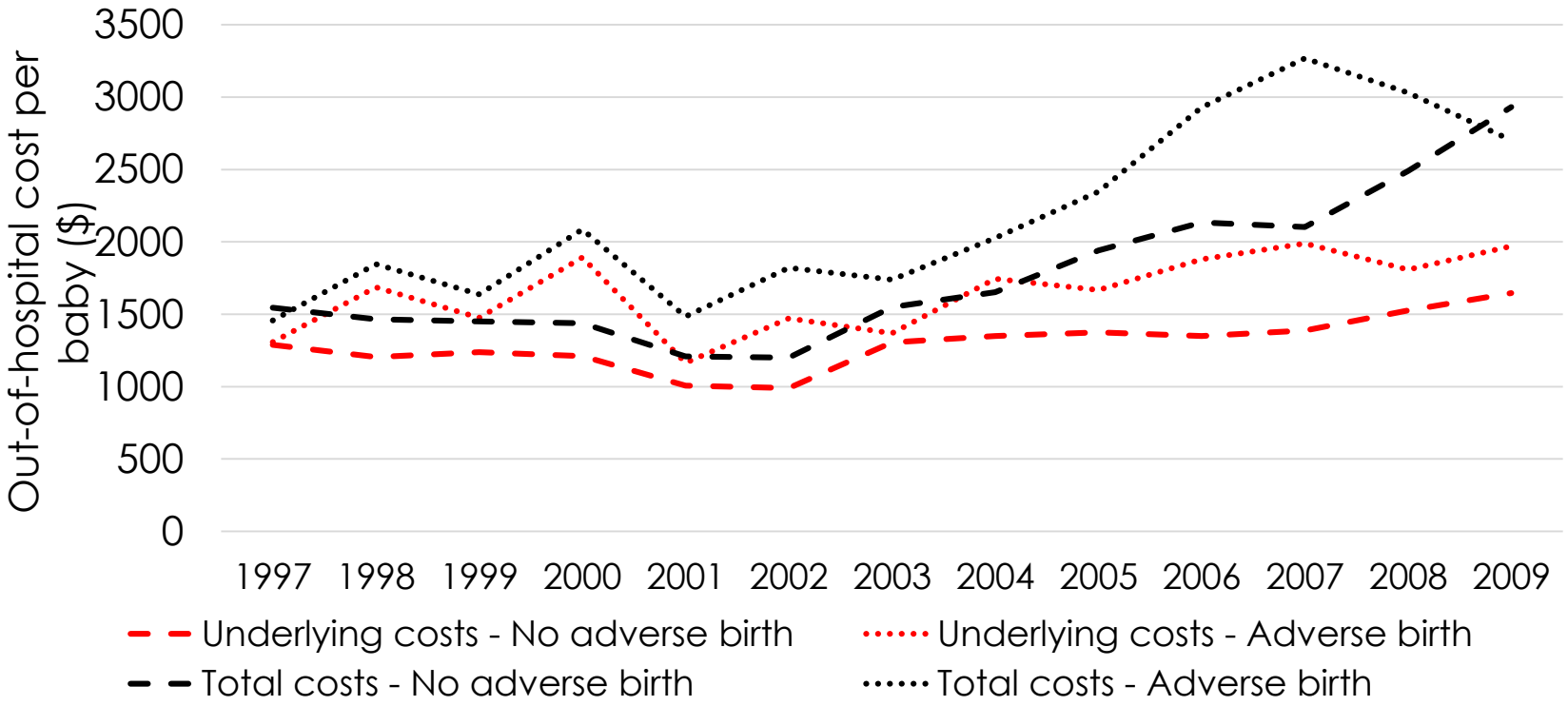
Out-of-hospital cost differential

All costs inflated to December 2015



Out-of-hospital cost differential

All costs inflated to December 2015



Out-of-hospital cost risk factors (underlying GLM)

Significant Factors	Antenatal		Postnatal	
	Public	Private	Public	Private
IVF (Yes)	●	●		
Infertility (More infertile)	●			
Specialist use (More use)		●		●
GP use (More use)	●	●	●	●
Anxiety (Yes)		●	●	●
Intense anxiety (Yes)	●			
Stress about own health (More stress)		●	●	●
Postnatal depression (Yes)			●	●
Cancer (Yes)			●	●
Area (Less remote)	●	●	●	●
Adverse birth (Yes)			●	
Type 1 diabetes (Yes)		●		
Elective caesarean (Yes)		●		

● **High cost impact** ● **Low cost impact**

How to transform this into practical policy?

MENTAL HEALTH POLICY

Initiative 1

Universal and improved screening for mental health in perinatal period

Outcomes

High risk women identified through inclusion of additional risk factors in screening protocols (Chojenta, 2013)

Offered appropriate support to reduce burden of poor mental health

How to transform this into practical policy?

Initiative 2

Early intervention

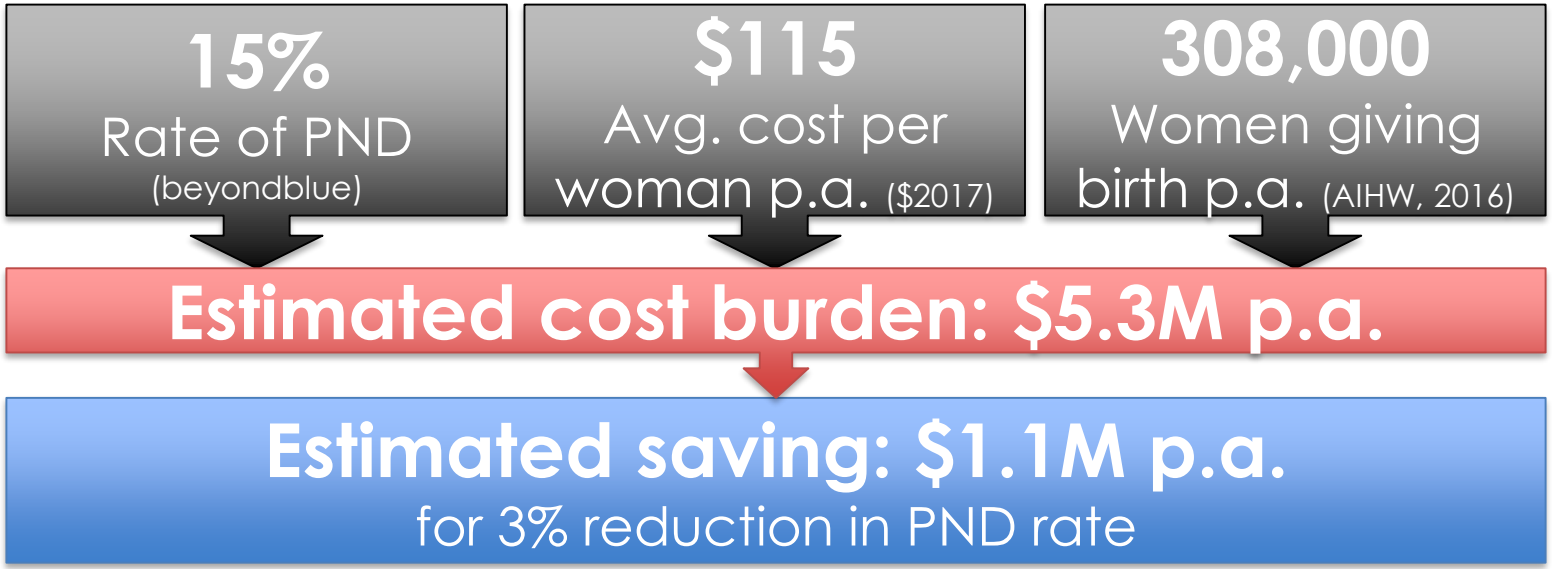
Outcomes

High risk women identified earlier in life (key predictor of poor perinatal mental health is history of mental health illness)

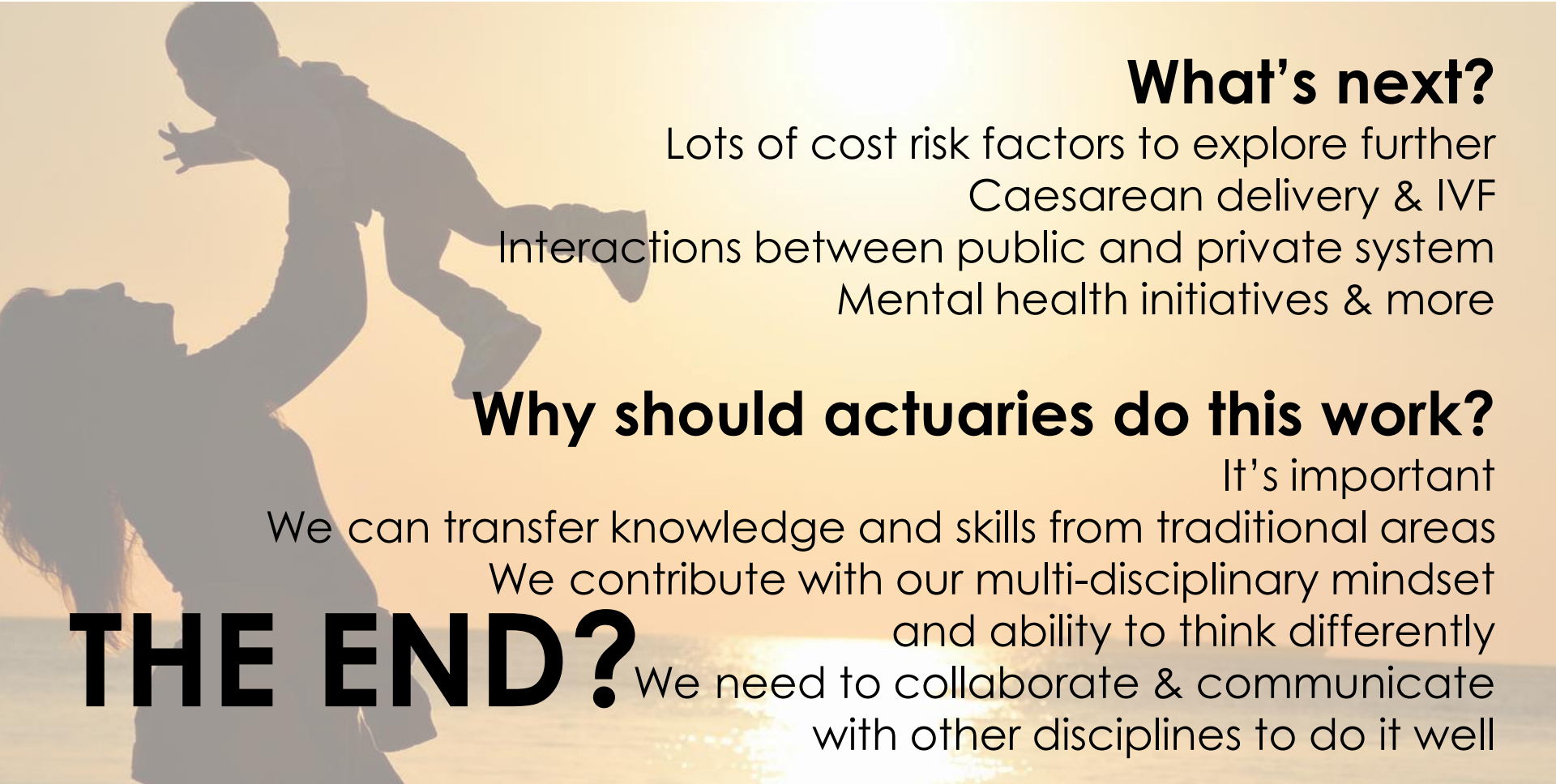
Re-allocating resources into early intervention may reduce costs over the life-course & improve maternal outcomes

How much could we save?

Consider postnatal depression (PND) out-of-hospital costs only…



Full cost benefit analysis required



What's next?

Lots of cost risk factors to explore further
Caesarean delivery & IVF
Interactions between public and private system
Mental health initiatives & more

Why should actuaries do this work?

It's important
We can transfer knowledge and skills from traditional areas
We contribute with our multi-disciplinary mindset
and ability to think differently
We need to collaborate & communicate
with other disciplines to do it well

THE END?