

# Differences-in-Differences

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Analysing change over time

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Preparing for Life Evaluation Team, July 2012



# How do we analyse change over time?



- Evaluation team collect data at regular intervals using set questionnaires
- Questions are repeated at various points allowing a pre/post intervention analysis
- But what if some attributes (e.g. Maternal health) are improving over time for both Treatment and Control due to outside factors?



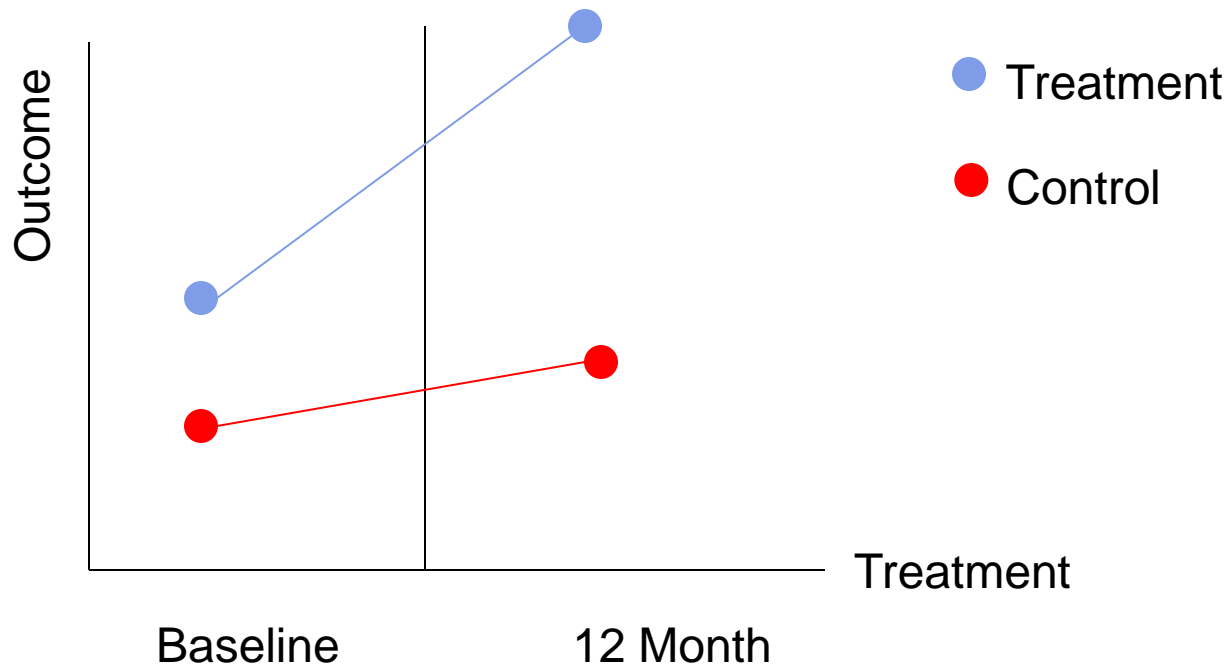
# Identifying Assumption

- Whatever happens to the control group over time is what would have happened to the treatment group in the absence of the program.



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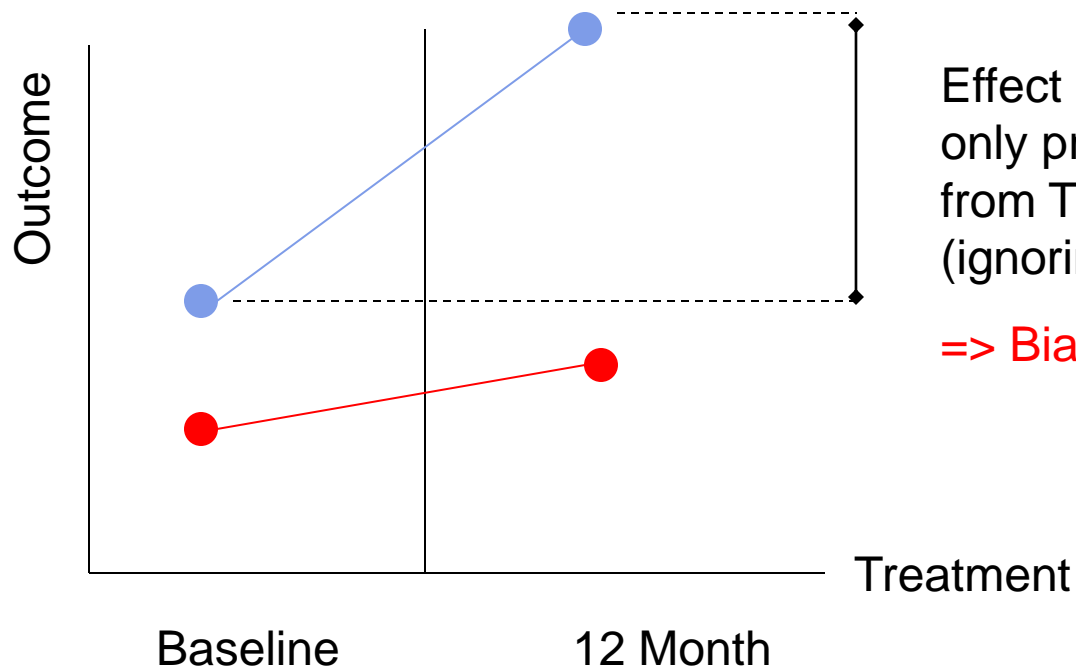
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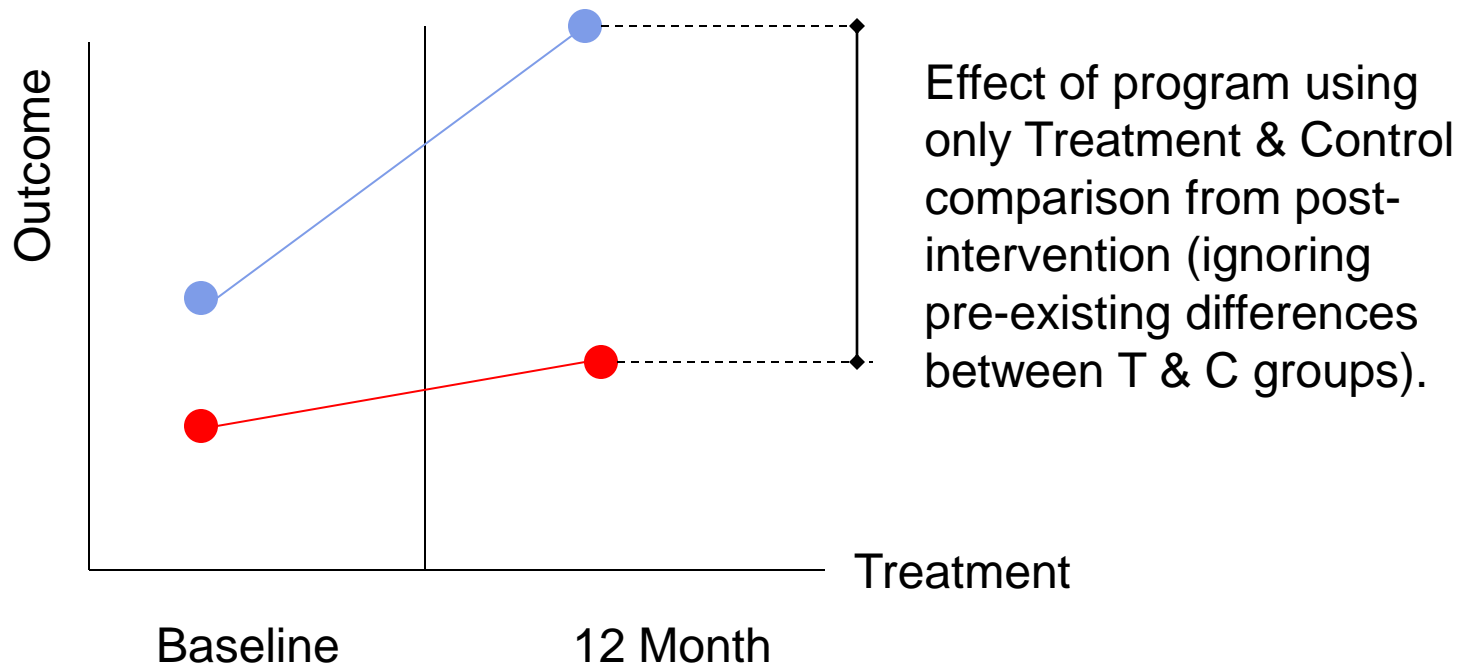
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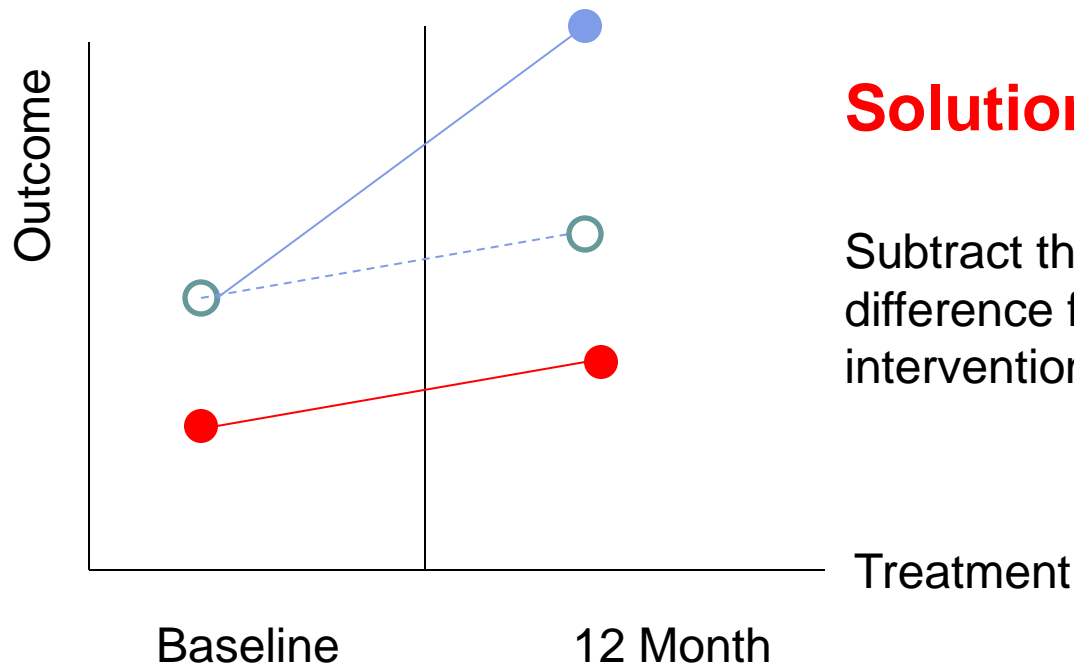
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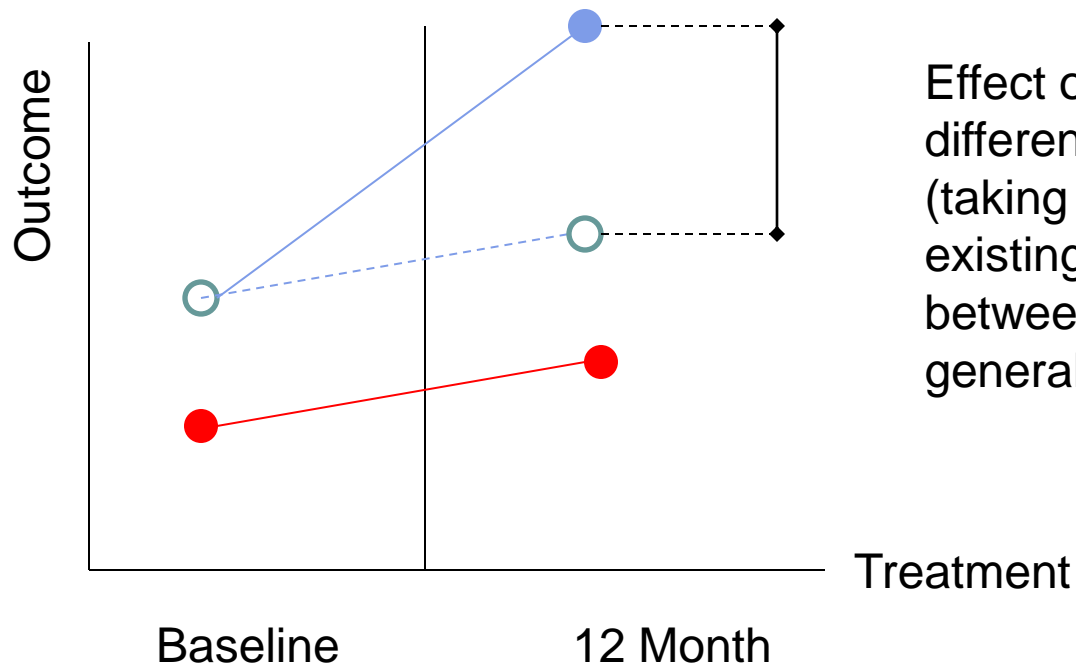
## Solution!

Subtract the pre-existing difference from the post intervention difference



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# Uses of Diff-in-Diff

- Simple two-period, two-group comparison
- Can also do much more complicated analysis, comparing two groups over many time periods
- Major component of evaluation from 12m+
- Can be used in a Regression Framework

# Preparing for Life



Measure	BL	6M	12M	18M	24M	36M	48M
Parenting Risks (AAPi)	X		X				X
Knowledge of Parenting (KIDI)	X		X				
Parental Stress Index		X			X		X
Perceptions and Behaviours (Pacotis)		X			X		
Maternal Self Efficacy	X		X		X		X
Psychological Well-being	X	X	X			X	X
Measure of HOME Environment		X		X		X	
Indicators of Domestic Risk	X		X		X		X
Ages & Stages Questionnaire		X	X	X	X	X	X
Communication Development			X	X	X		



# PFL Example

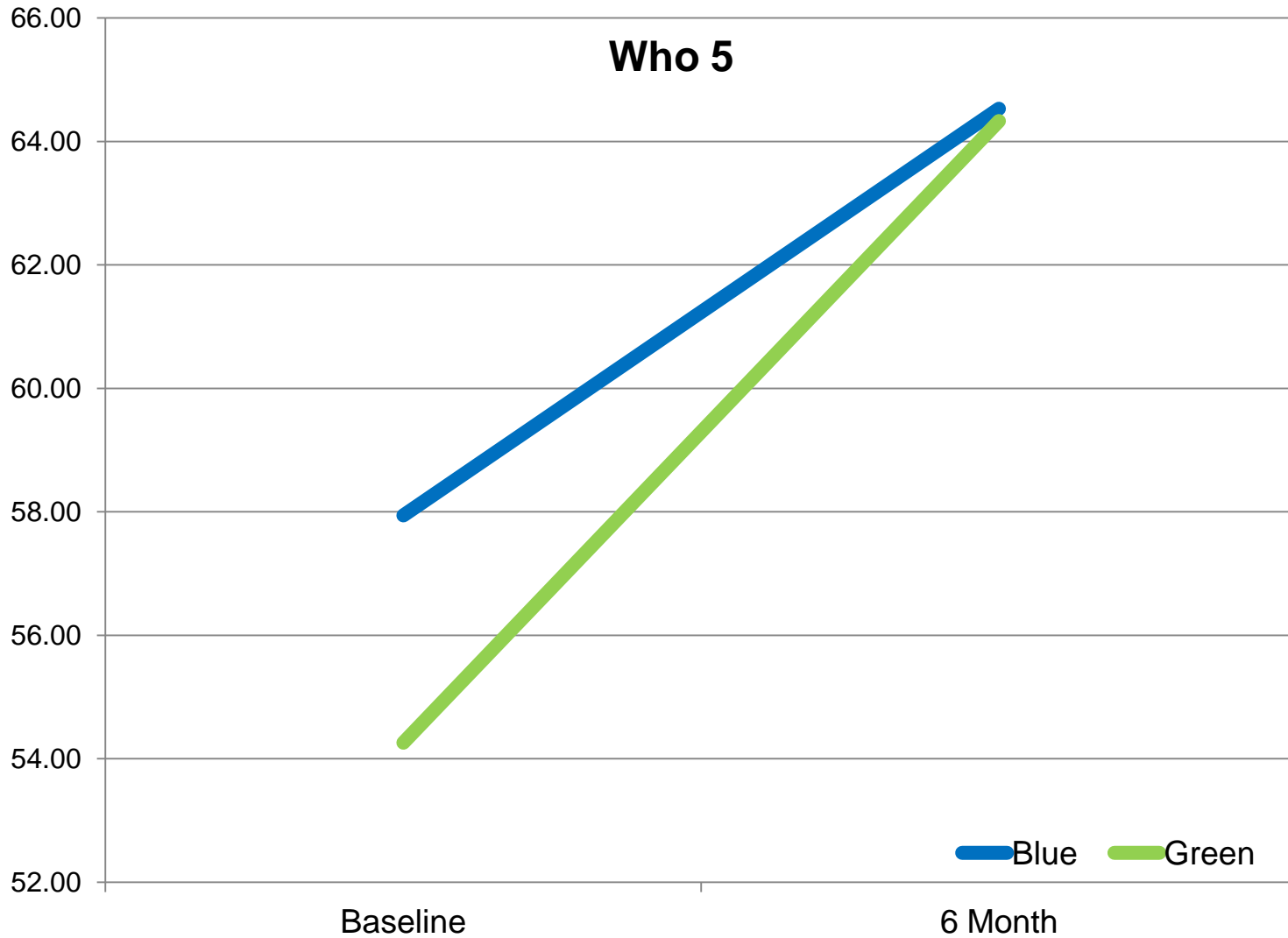
- WHO 5 Index- Maternal Psychological Well-Being
- Collected at Baseline, 6m, 12m, 36m and 48m

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	<b>Blue</b>	<b>Green</b>	
<b>Baseline (mean)</b>	57.94	54.26	
<b>6 Month (mean)</b>	64.53	64.33	
<b>Difference</b>	6.59	10.07	<b>DID = 3.48</b>

- We can test this figure for significance using Regression

# PFL Example





# PFL Example

- Put Data in Long format
- $\text{Who5} = \alpha + \beta_1(6m) + \beta_2(\text{Group}) + \beta_3(6m * \text{Group}) + \varepsilon$
- $\beta_3$  is Coefficient of Interest

Variable	Coefficient	Std. Error	t	P Value
6 Month	6.59	3.22	2.05	0.04
Group	-3.67	3.03	-1.21	0.23
6M x Group	3.48	4.44	0.78	0.43
Constant	57.94	2.29	25.4	0.00



# References

- Angrist J., Pischke J.S. [2008], *Mostly Harmless Econometrics*, Princeton University Press, NJ
- Bertrand M., Duflo E. and Mullainathan S. [2004], How Much Should We Trust Differences-in-Differences Estimates?, in *The Quarterly Journal of Economics*, 2004, vol. 119, n. 1, pp. 249-275.
- Card D., Krueger A. [1994], Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania, in «*The American Economic Review*», 1994, vol. 84, n. 4, pp. 772-793.