

# Declaration of conflicts

- According to the Labour Progression study, LaPS  
I have no conflicts of interest to declare

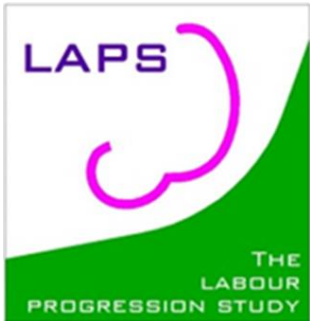
Linköping, September 1<sup>st</sup> 2022

Stine Bernitz, midwife, PhD, Associate professor/researcher  
Oslo Metropolitan University / Østfold Hospital Trust, Norway



# The Labour Progression Study, LaPS

A Multi Centre Cluster Randomized Trial, Investigating the Effect of the WHO Partograph and the Zhang Guideline for Assessing Labour Progression on Intrapartum Caesarean Section



Stine Bernitz, RN, RM, PhD

Associate professor/researcher

OSLOMET

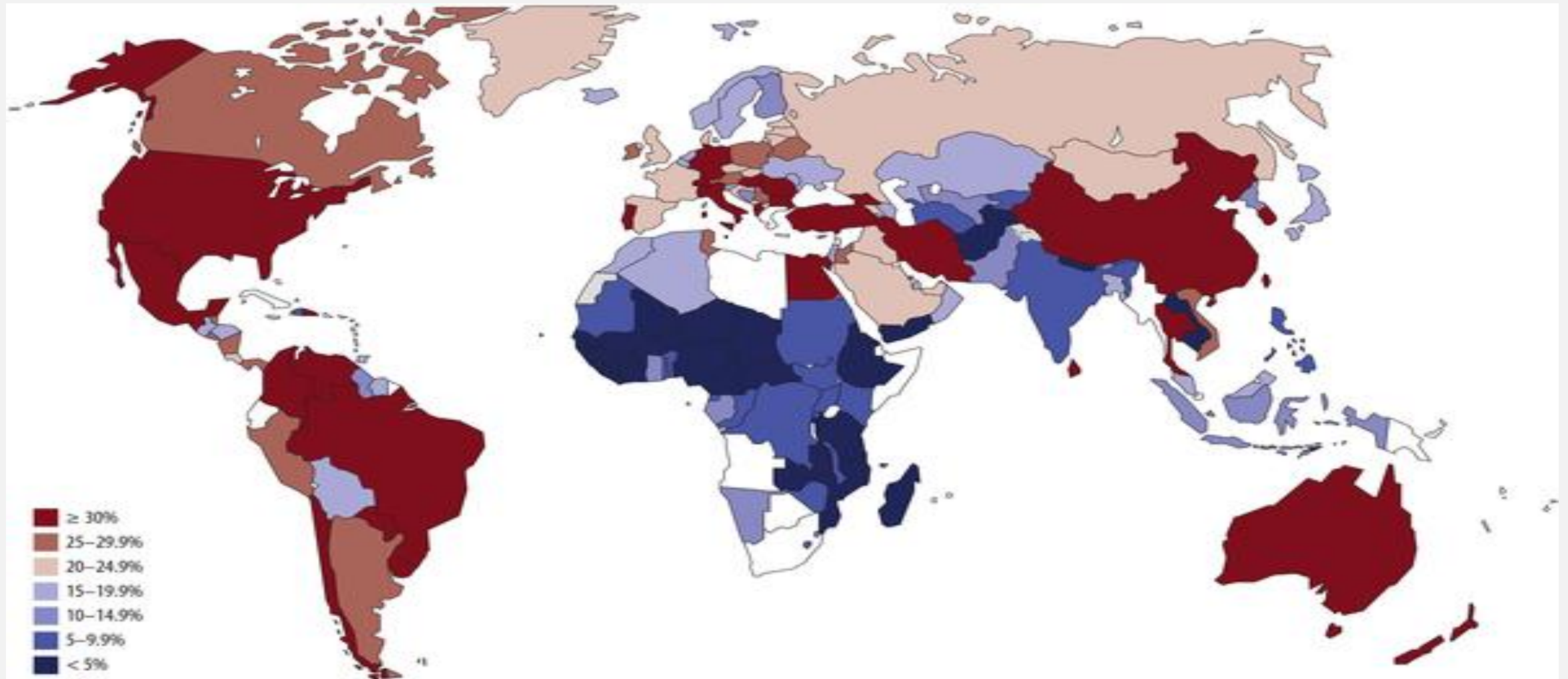
Oslo Metropolitan University, Norway/ Østfold Hospital Trust, Norway

THE LANCET

"UK scientific leaders seem united in their resistance to a calamitous exit from the EU. Unfortunately, their words are likely to be too little, too late."



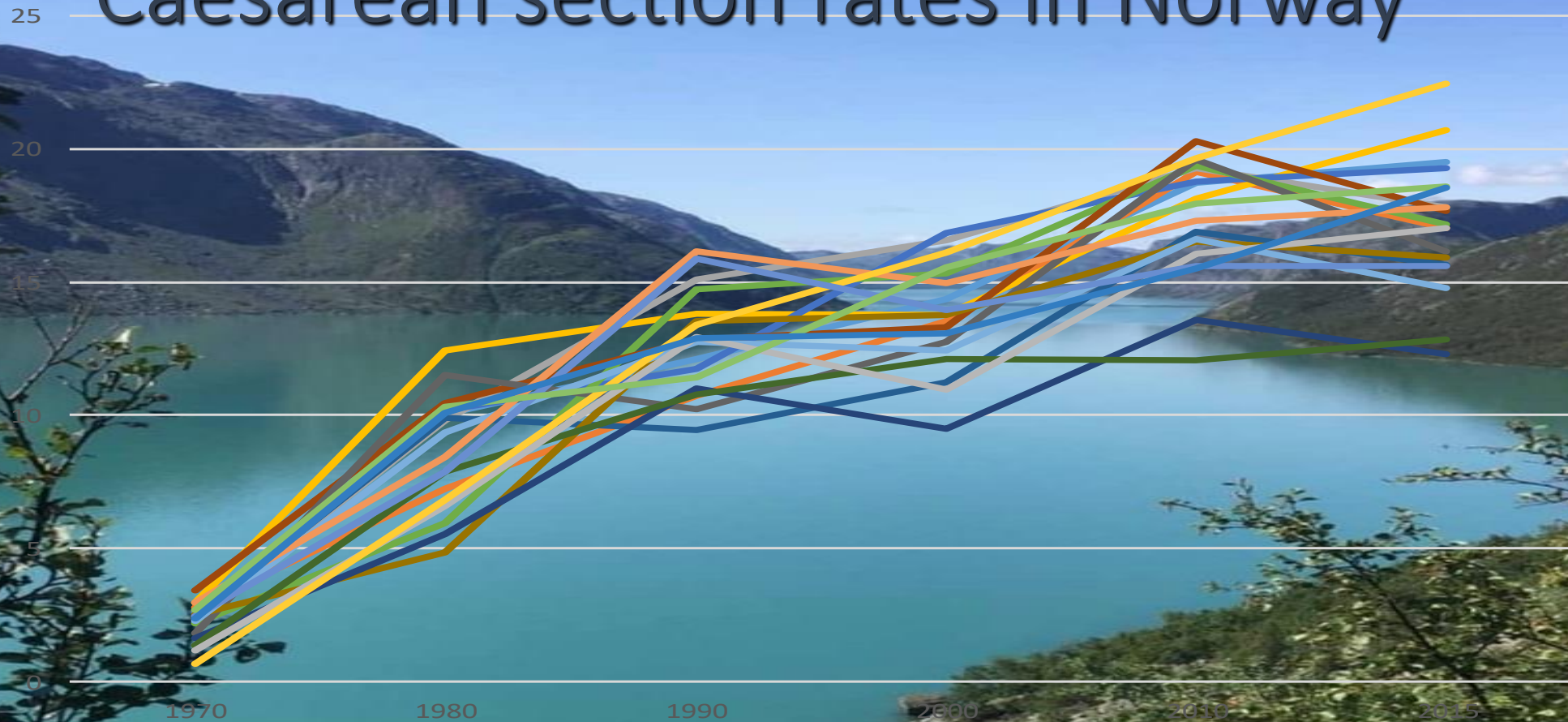
Latest available data on caesarean section rates by country (not earlier than 2005).



Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, et al. (2016) The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. PLOS ONE 11(2): e0148343. <https://doi.org/10.1371/journal.pone.0148343>  
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0148343>



# Caesarean section rates in Norway



- Østfold
- Oppland
- Aust Agder
- Sogn og Fjordane
- Nordland
- Akershus
- Buskerud
- Vest Agder
- Møre og Romsdal
- Trøndelag
- Oslo
- Vestfold
- Rogaland
- Sør-Trøndelag
- Finmark
- Hedemark
- Telemark
- Hordaland
- Nord-Trøndelag

# Challenges

- Most common indication for intrapartum caesarean sections: slow progress of labour (labour dystocia)
- There is no consensus on duration of labour; hence no consensus on when labour dystocia should be diagnosed
- Increasing use of synthetic oxytocin, even in cases with no labour dystocia

# Assessing labour progression

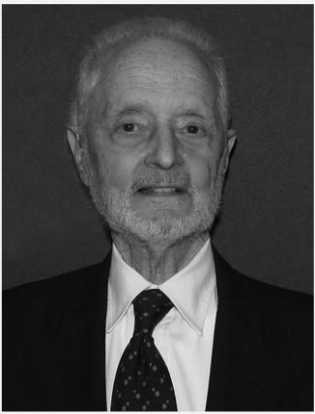
- The partograph is used in many countries world-wide to enable early detection of complications so that referral, action or closer observations can ensue
- The partograph receives global support, still there are concerns that it has not reached its full potential in improving clinical outcomes. This has resulted in several variations of the tool and a plethora of studies that aim to explore the benefits and the optimum design
- The advantages and disadvantages of the partograph are being discussed and investigated, both if it should be used and if so, which is the preferred design

Lavender T, Cuthbert A, Smyth RM. Effect of partograph use on outcomes for women in spontaneous labour at term and their babies. Cochrane Database Syst Rev. 2018;8:CD005461.

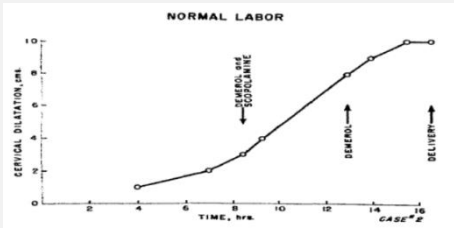
Groeschel N, Glover P. The partograph. Used daily but rarely questioned. Aust J Midwifery. 2001;14(3):22-7.

WHO recommendations: Intrapartum care for a positive childbirth experience. WHO Guidelines Approved by the Guidelines Review Committee. Geneva 2018

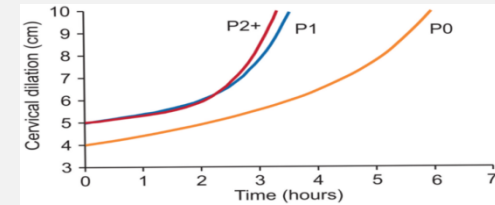




# The WHO partograph vs Zhang's guideline



Static guideline



Dynamic guideline



Cervical Dilation (cm)	Parity 0 (n=25,624)	Parity 1 (n=16,755)	Parity 2+ (n=16,219)
3-4	1.8 (8.1)	—	—
4-5	1.3 (6.4)	1.4 (7.3)	1.4 (7.0)
5-6	0.8 (3.2)	0.8 (3.4)	0.8 (3.4)
6-7	0.6 (2.2)	0.5 (1.9)	0.5 (1.8)
7-8	0.5 (1.6)	0.4 (1.3)	0.4 (1.2)
8-9	0.5 (1.4)	0.3 (1.0)	0.3 (0.9)
9-10	0.5 (1.8)	0.3 (0.9)	0.3 (0.8)
Second stage with epidural analgesia	1.1 (3.6)	0.4 (2.0)	0.3 (1.6)
Second stage without epidural analgesia	0.6 (2.8)	0.2 (1.3)	0.1 (1.1)

Data are median (95<sup>th</sup> percentile).

Friedman E. The graphic analysis of labor. Am J Obstet Gynecol 1954

Zhang et al. Contemporary Patterns of Spontaneous Labor With Normal Neonatal Outcomes. Obst. & gyn 2010

Philpott RH, Castle WM. Cervicographs in the management of labour in primigravidae. II. The action line and treatment of abnormal labour. J Obstet Gynaecol Br Commonw. 1972.

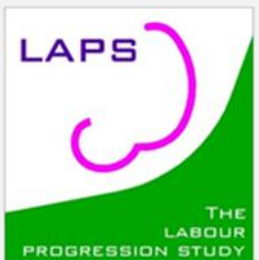
WHO [http://whqlibdoc.who.int/publications/2007/9241545879\\_eng.pdf](http://whqlibdoc.who.int/publications/2007/9241545879_eng.pdf)

# Objective of the LaPS

To investigate whether the rate of intrapartum cesarean section differ when adhering to Zhang's guideline for labor progression compared to the WHO partograph for nulliparous women who had a singleton fetus, cephalic presentation and spontaneous onset of active labour at term

## Hypotesis

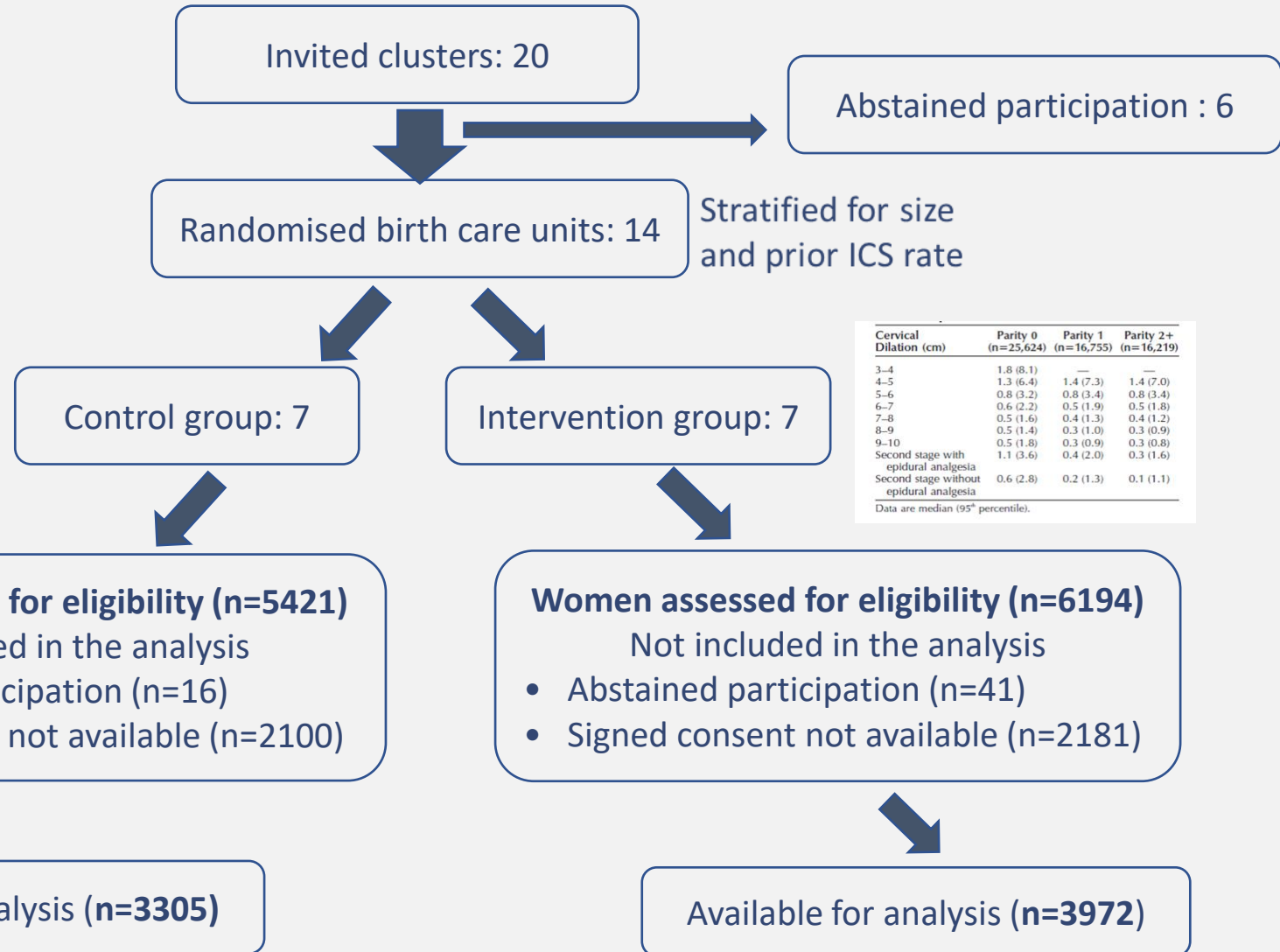
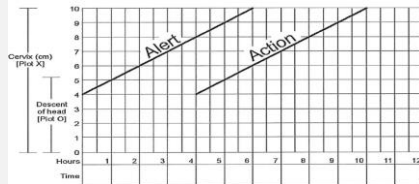
Intrapartum caesarean section rate can be reduced by 25 % by adhering to Zhang's guideline compared to the WHO partograph





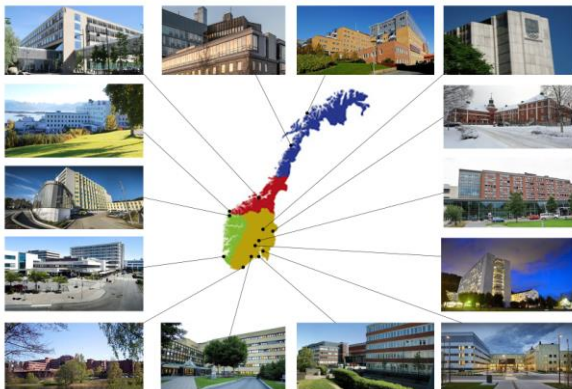
# Study design

Multicentre cluster randomised design (Power: 80 %, significance level: 95 %:  
14 clusters/birth care units and 6582 participants)



Cervical Dilation (cm)	Parity 0 (n=25,624)	Parity 1 (n=16,755)	Parity 2+ (n=16,219)
3-4	1.8 (8.1)	—	—
4-5	1.3 (6.4)	1.4 (7.3)	1.4 (7.0)
5-6	0.8 (3.2)	0.8 (3.4)	0.8 (3.4)
6-7	0.6 (2.2)	0.5 (1.9)	0.5 (1.8)
7-8	0.5 (1.6)	0.4 (1.3)	0.4 (1.2)
8-9	0.5 (1.4)	0.3 (1.0)	0.3 (0.9)
9-10	0.5 (1.8)	0.3 (0.9)	0.3 (0.8)
Second stage with epidural analgesia	1.1 (3.6)	0.4 (2.0)	0.3 (1.6)
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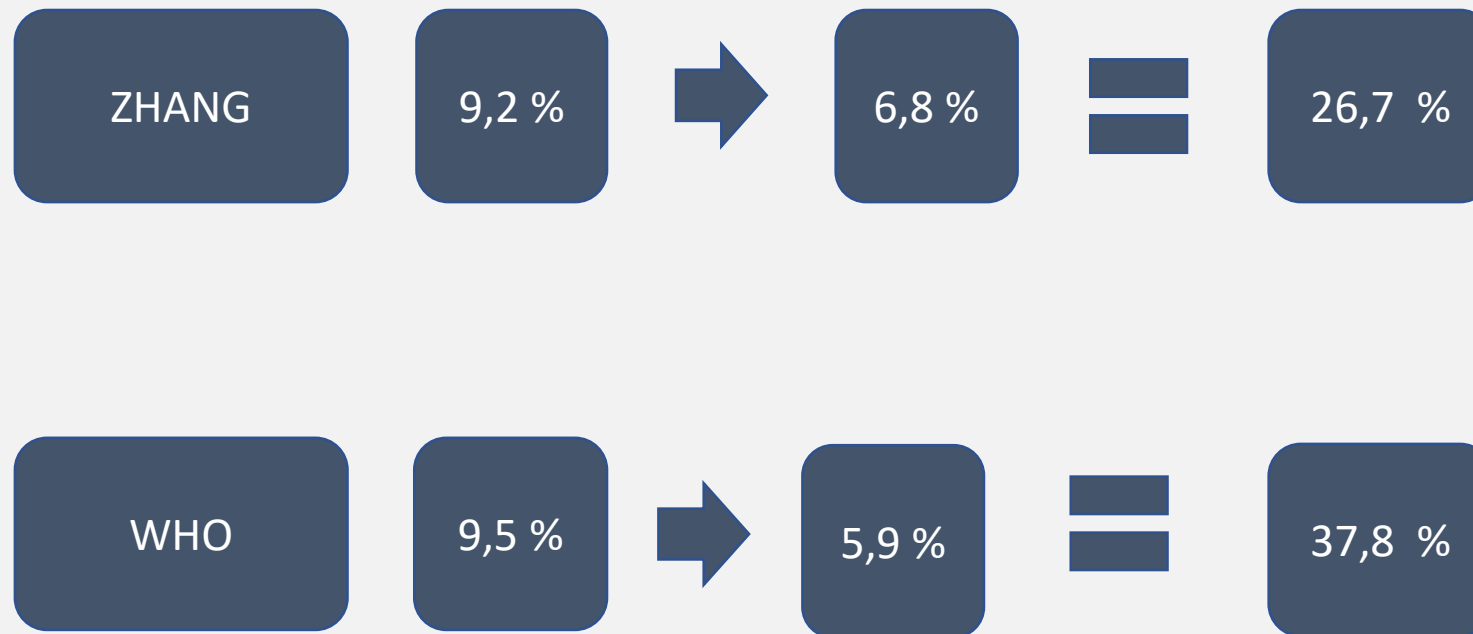
Data are median (95<sup>th</sup> percentile).



# Baseline characteristics

	<b>Zhang group</b>	<b>WHO group</b>
	<b>Participants</b> (n=3972)	<b>Participants</b> (n=3305)
<b>Hospital characteristics</b>		
Deliveries per year		
<3000, 6 hospitals in each group, n (%)	2688 (36.9)	2233 (30.7)
≥3000, 1 hospital in each group, n (%)	1284 (17.6)	1072 (14.7)
<b>Characteristics related to the mother</b>		
Maternal age in year at delivery, mean (SD)	28.4 (4.6)	28.5 (4.5)
Civil status (cohabitant or married), n (%)	3741/3946** (94.8)	3137/3271** (95.9)
Higher education >12 years, n (%)	2412 (60.7)	2017 (61.0)
Smoking during first trimester, n (%)	230/3963** (5.8)	210/3247** (6.5)
Pre-pregnant body mass index <sup>†</sup> , mean (SD)	23.6/3966** (4.3)	23.8/3287** (4.3)
Gestational age at onset of active labour (days), mean (SD)	281 (7.0)	281 (8.0)
<b>Characteristics related to the newborn</b>		
Birth weight (gram), mean (SD)	3528 (427)	3518 (414)
Head circumference (cm), mean (SD)	35.0 (1.4)	35.0 (1.4)

# Main outcome: intrapartum cesarean sections



	WHO partograph (control) group		Zhang's guideline (intervention) group	
	n (%)	Number assessed	n (%)	Number assessed
<b>Primary endpoint</b>				
Intrapartum caesarean sections*	196 (5.9%)	3305	271 (6.8%)	3972
<b>Descriptive endpoints</b>				
Intrapartum caesarean sections for labour dystocia	132 (67.3%)	196	178 (65.7%)	271
Intrapartum caesarean sections for labour dystocia at a cervical dilatation of less than 6 cm	28 (21.2%)	132	25 (14.0%)	178
Labour dystocia, according to the allocated guideline	1512 (45.7%)	3305	1882 (47.4%)	3972
Labour dystocia, according to the allocated guideline, diagnosed at a cervical dilatation of less than 6 cm	214 (14.2%)	1512	222 (11.8%)	1882
Initiation of synthetic oxytocin during labour at a cervical dilatation of less than 6 cm	289 (18.5%)	1561	244 (14.7%)	1658
Duration of active phase of labour, hours†	6.05 (3.38–9.50)	NA	6.59 (3.55–10.53)	NA

NA=not applicable. \* Adjusted relative risk is 1.17 (95% CI 0.98–1.40;  $p=0.08$ ), giving an adjusted risk difference of 1.0% (95% CI –0.1 to 2.1), and an intraclass correlation coefficient (estimated within centres) of  $3.4 \times 10^{-34}$ ; the number needed to treat with the WHO guideline to avoid one intrapartum caesarean section was therefore 100. †Data are median (IQR).

**Table 2: Intrapartum caesarean sections and labour dystocia**



## Secondary outcomes

	WHO partograph (control) group (n=3305)	Zhang's guideline (intervention) group (n=3972)	Adjusted relative risk (95% CI)	Adjusted risk difference (95% CI)	p value	Intraclass correlation coefficient, assessed within centres (95% CI)
<b>Clinical interventions during labour</b>						
Operative vaginal delivery	581 (17.6%)	839 (21.1%)	1.06 (0.84–1.34)	1.1% (–3.3 to 5.5)	0.62	0.02 (0.01–0.06)
Artificial rupture of the membranes	1223 (37.0%)	1396 (35.1%)	0.92 (0.79–1.06)	–3.2% (–8.4 to 2.0)	0.23	0.01 (0.01–0.03)
Augmentation with oxytocin during labour	1561 (47.2%)	1658 (41.7%)	0.98 (0.84–1.15)	–0.8% (–7.8 to 6.1)	0.81	0.02 (0.01–0.05)
Epidural analgesia	1653 (50.0%)	1913 (48.2%)	0.96 (0.81–1.15)	–1.9% (–10.5 to 6.8)	0.67	0.03 (0.01–0.07)
Perineal surgical incision in women delivering vaginally	881 (28.3%)*	1151 (31.1%)†	0.91 (0.68–1.20)	–2.9% (–11.3 to 5.5)	0.50	0.04 (0.02–0.09)
<b>Other secondary outcomes</b>						
Obstetric anal sphincter injuries in women delivering vaginally	79 (2.5%)*	112 (3.0%)†	1.14 (0.86–1.52)	0.4% (–0.4 to 1.2)	0.36	1.9 × 10 <sup>–34</sup> (NE)
Blood transfusion administered	82 (2.5%)	115 (2.9%)	1.16 (0.79–1.69)	0.4% (–0.6 to 1.4)	0.45	0.02 (0.01–0.11)
Apgar score of less than 7 after 5 min	36 (1.1%)	49 (1.2%)	1.14 (0.74–1.75)	0.2% (–0.3 to 0.7)	0.55	1.7 × 10 <sup>–35</sup> (NE)
Neonates with an umbilical cord artery pH of less than 7.0‡	19 (0.6%)	22 (0.6%)	0.99 (0.46–2.15)	0 (–0.4 to 0.4)	0.98	0.04 (0.01–0.46)

Data are n (%). NE=not estimable. \*Out of 3109 participants assessed. †Out of 3701 participants assessed. ‡Missing values (33%) were imputed with best outcome.

**Table 3: Secondary outcomes**



Despite the non- significant difference in intrapartum caesarean section rate between the groups, we found a remarkable and overall decrease.

This might be explained by the close focus on assessing labour progression rather than the use of the guidelines itself.



# The use of oxytocin

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## ORIGINAL RESEARCH ARTICLE



## The Labor Progression Study: The use of oxytocin augmentation during labor following Zhang's guideline and the WHO partograph in a cluster randomized trial

Rebecka Dalbye<sup>1,2</sup> | Stine Bernitz<sup>1,2</sup> | Inge Christoffer Olsen<sup>3</sup> | Jun Zhang<sup>4</sup> |  
Torbjørn Moe Eggebø<sup>5,6</sup> | Daniella Rozsa<sup>6</sup> | Kathrine Frey Frøslie<sup>7</sup> | Pål Øian<sup>8</sup> |  
Ellen Blix<sup>2</sup>

	Intervention group (n = 3972)	Control group (n = 3305)	Estimated difference (95% CI)	P-value
Oxytocin augmentation during labor, n (%)	1658 (41.7)	1561 (47.2)	ARR: 0.98 (0.84 to 1.15) ARD: -0.8% (-7.8 to 6.1)	0.8
Duration of oxytocin augmentation (minutes), <sup>a</sup> median (IQR)	134 (57-270)	115 (50-250)	AMD: 17.9 (2.7 to 33.1)	0.021
Maximum dose of oxytocin augmentation (mL/h), <sup>a</sup> median (IQR)	75 (45-120)	90 (60-120)	AMD: -0.1 (-13.5 to 13.3)	0.99
Dose of oxytocin when initiating augmentation (mL/h) <sup>a</sup> median (IQR)	30 (30-30)	30 (15-30)	AMD: -0.4 (-3.6 to 2.9)	0.82
Discontinuation of oxytocin, <sup>a</sup> n (%) <sup>b</sup>	74 (4.5%)	54/1554 (3.5%)		
Cervical dilatation when initiating oxytocin (cm), <sup>a</sup> n (%) <sup>c</sup>				
4 cm	101 (6.1)	128 (8.2)	ARR: 0.73 (0.55 to 0.98) ARD: -2.2 (-4.2 to -0.1)	0.04
5 cm	244 (14.7)	289 (18.5)	ARR: 0.79 (0.66 to 0.95) ARD: -3.9 (-6.9 to -0.9)	0.01
6 cm	399 (24.1)	443 (28.4)	ARR: 0.84 (0.75 to 0.94) ARD: -4.6 (-7.6 to -1.6)	0.003
7 cm	552 (33.3)	565 (36.2)	ARR: 0.92 (0.83 to 1.01) ARD: -3.0 (-6.3 to 0.2)	0.07
8 cm	712 (42.9)	692 (44.3)	ARR: 0.96 (0.88 to 1.05) ARD: -1.7 (-5.7 to 2.3)	0.40
9 cm	914 (55.1)	835 (53.5)	ARR: 1.01 (0.93 to 1.11) ARD: 0.8 (-4.1 to 5.7)	0.8
10 cm	1658 (100)	1561 (100)	ARR: 0.98 (0.88 to 1.09) ARD: -0.8 (-5.7 to 4.1)	0.8

Abbreviations: AMD, adjusted mean difference; ARD, adjusted risk difference; ARR, adjusted relative risk; IQR, interquartile range.

<sup>a</sup>Include women with oxytocin augmentation during labor.

<sup>b</sup>Total numbers are presented due to missing values.

<sup>c</sup>Numbers in % are cumulative.



# Duration of labour

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Midwifery

journal homepage: [www.elsevier.com/locate/midw](http://www.elsevier.com/locate/midw)



The Labour Progression Study (LaPS): Duration of labour following Zhang's guideline and the WHO partograph – A cluster randomised trial



Rebecka Dalbye<sup>a,b,\*</sup>, Ellen Blix<sup>b</sup>, Kathrine Frey Frøslie<sup>c</sup>, Jun Zhang<sup>d</sup>, Torbjørn Moe Eggebø<sup>e,f</sup>, Inge Christoffer Olsen<sup>g</sup>, Daniella Rozsa<sup>f</sup>, Pål Øian<sup>h,i</sup>, Stine Bernitz<sup>a,b</sup>

# Duration of stages and phases and in active labour.

	Zhang group <i>n</i> = 3972		WHO group <i>n</i> = 3305		Accelerated delivery	Adjusted median	p-value
	Unadjusted median (5th, 95th percentile)	Adjusted estimated median (95% CI)	Unadjusted median (5th, 95th percentile)	Adjusted estimated median (95% CI)	time factor (95% CI)	difference (95% CI)	
Duration of labour (≥4 cm to delivery) <sup>†</sup> (hours)	6.6 (1.4, 16.0)	7.0 (6.5–7.5)	6.1 (1.3, 13.8)	6.2 (5.7–6.6)	1.14 (1.0–1.2)	0.84 (0.2–1.5)	0.008
Duration of 1st stage (4 cm to 10 cm) <sup>†,*</sup> (hours)	5.0 (0.5, 15.0)	5.6 (5.2–6.0)	4.5 (0.5, 12.5)	4.9 (4.5–5.4)	1.13 (1.0- 1.3)	0.66 (0.1–1.2)	0.023
Duration of 2nd stage (10 cm to delivery) <sup>‡</sup> (min)	76 (17, 242)	88 (83.2–92.7)	75 (16, 204)	77 (72.4–81.4)	1.14 (1.1–1.2)	0.18 (0.1–0.3)	0.000

CI: Confidence interval.

Analysed with Weibull regression, adjusted for annual ICS rates and number of deliveries, maternal age, body-mass index, civil status, educational level, cervical dilatation at first registration and birthweight and head circumference of the neonate.

<sup>†</sup> Full Analysis Set (FAS)

\* Censoring; ICS.

<sup>‡</sup> Women with ICS in the first stage of labour were left censored at the time of ICS and not included in the analysis.

# Childbirth Experience

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## ORIGINAL RESEARCH ARTICLE

# The effect of Zhang's guideline versus the WHO partograph on childbirth experience measured by the Childbirth Experience Questionnaire in the Labor Progression Study (LaPS): A cluster randomized trial

Daniella Judit Rozsa<sup>1,2</sup> | Rebecka Dalbye<sup>3,4</sup> | Stine Bernitz<sup>3,4</sup> | Ellen Blix<sup>4</sup> |  
Ingvild Dalen<sup>5</sup> | Geir Sverre Braut<sup>5</sup> | Torbjørn M. Eggebø<sup>1,6</sup> | Pål Øian<sup>7</sup> |  
Ragnar Kvie Sande<sup>1,8</sup>



**Stine Bernitz, Midwife, PhD/ Ass. professor**

Department of Obst & Gyn., Østfold Hospital Trust  
Department of Nursing and Health Promotion,  
Faculty of Health Sciences, Oslo Metropolitan University,  
Oslo, Norway



**Rebecka Dalbye, Midwife, PhD/Ass. professor**

Department of Obst & Gyn., Østfold Hospital Trust  
Department of Nursing and Health Promotion,  
Faculty of Health Sciences, Oslo Metropolitan University,  
Oslo, Norway



**Ellen Blix, Midwife, DrPh, Professor**

Department of Nursing and Health Promotion,  
Faculty of Health Sciences, Oslo Metropolitan University,  
Oslo, Norway



**Pål Øian, MD, PhD, Professor**

Department of Obstetrics and Gynecology,  
University Hospital of North Norway, Norway  
University of Tromsø, Norway



**Jim Zhang, MD, PhD, Professor**

MOE-Shanghai Key Lab of Children's Environmental Health,  
Xinhua Hospital, Shanghai  
Jiaotong University School of Medicine, Shanghai, China



**Torbjørn Moe Eggebø, MD, PhD, professor**

National Center for Fetal Medicine, Trondheim University Hospital  
(St Olavs Hospital), Trondheim, Norway.  
Department of Obstetrics and Gynecology,  
Stavanger University Hospital, Stavanger, Norway



**Inge Christoffer Olsen, Statistician, PhD**

Research Support Services, Clinical Trial Unit,  
Oslo University Hospital, Oslo, Norway



**Kathrine Frey Frøslie, Statistician, PhD**

Norwegian National Advisory Unit on Women's Health,  
Oslo University Hospital, Oslo, Norway



**Daniella Judit Rozsa, MD, PhD student**

Department of Obst & Gyn.  
Stavanger University Hospital, Norway

