

## Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: Moster D, Lie RT, Markestad T. Long-term medical and social consequences of preterm birth. N Engl J Med 2008;359:262-73.

Web Table 1. ICD-9 and ICD-10 diagnoses registered in The National Insurance Scheme used to categorize neurological and mental disorders.

	ICD 9	ICD 10
Cerebral Palsy	342-344	G80-G83
Mental retardation	317-319	F70-F79
Schizophrenia	295	F20-F21
Autism spectrum	299	F84
Disorders of psychological development, behavior and emotion	307.0 307.2-307.3 307.5-307.7 307.9 309.2 309.8 312-315 784.6	F80-F83 F88-F98

V40.0-V40.1

Other major  
disabilities

Epilepsy	345	G40-G41
Blindness, low vision	369	H54
Hearing loss	389	H90-H91

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Web Table 2. Medical disabilities in relation to gestational age at birth divided according to year of birth.\*

	<u>1967-1972</u>			<u>1973-1978</u>			<u>1979-1983</u>		
	Percent	RR (95% CI)	Trend	Percent	RR (95% CI)	Trend	Percent	RR (95% CI)	Trend
Cerebral palsy†			p<0.001			p<0.001			p<0.001
23 Wk to 27 wk 6 d	5.0%	36 (14-95)		5.3%	45 (20-98)		14.9%	135 (90-203)	
28 Wk to 30 wk 6 d	6.0%	47 (33-66)		5.9%	42 (29-60)		6.0%	49 (33-73)	
31 Wk to 33 wk 6 d	2.1%	16 (12-21)		1.6%	12 (8.4-17)		1.9%	14 (9.1-21)	
34 Wk to 36 wk 6 d	0.4%	2.7 (2.0-3.7)		0.3%	2.4 (1.6-3.4)		0.4%	3.1 (2.1-4.5)	
≥ 37 Wk	0.1%	1.0 (reference)		0.1%	1.0 (reference)		0.1%	1.0 (reference)	
Mental retardation†			p<0.001			p<0.001			p<0.001
23 Wk to 27 wk 6 d	4.0%	4.7 (1.2-19)		4.4%	10 (4.4-24)		4.7%	15 (7.4-32)	
28 Wk to 30 wk 6 d	1.6%	3.6 (1.9-6.6)		1.7%	4.0 (2.1-7.4)		2.0%	5.4 (2.8-10)	

31 Wk to 33 wk 6 d	1.3%	2.8 (2.0-3.8)	0.7%	1.6 (1.0-2.7)	0.7%	1.5 (0.7-3.0)
34 Wk to 36 wk 6 d	0.7%	1.5 (1.2-1.8)	0.7%	1.6 (1.3-2.0)	0.6%	1.7 (1.2-2.3)
≥ 37 Wk	0.5%	1.0 (reference)	0.4%	1.0 (reference)	0.3%	1.0 (reference)

Disorders of psychological

development, behavior

and emotion†

p<0.001

p=0.001

p<0.001

23 Wk to 27 wk 6 d	1.0%	10 (1.5-72)	2.7%	13 (4.2-39)	3.4%	9.7 (4.2-23)
28 Wk to 30 wk 6 d	0.5%	4.9 (1.6-15)	0.7%	2.2 (0.7-6.9)	1.0%	2.7 (1.1-6.6)
31 Wk to 33 wk 6 d	0.2%	2.1 (0.9-4.8)	0.3%	1.0 (0.4-2.4)	0.6%	1.5 (0.8-2.9)
34 Wk to 36 wk 6 d	0.2%	1.7 (1.1-2.6)	0.4%	1.6 (1.1-2.2)	0.6%	1.4 (1.0-1.9)
≥ 37 Wk	0.1%	1.0 (reference)	0.2%	1.0 (reference)	0.4%	1.0 (reference)

Other major

disabilities†‡

p<0.001

p<0.001

p<0.001

23 Wk to 27 wk 6 d	4.0%	25 (9.6-65)	3.5%	17 (6.6-45)	4.7%	18 (8.7-37)
28 Wk to 30 wk 6 d	2.6%	13 (8.0-22)	2.3%	9.7 (5.5-17)	1.6%	5.1 (2.5-11)
31 Wk to 33 wk 6 d	0.4%	2.3 (1.3-4.1)	0.5%	2.2 (1.2-4.1)	0.7%	2.5 (1.4-4.5)
34 Wk to 36 wk 6 d	0.3%	1.6 (1.1-2.2)	0.3%	1.5 (1.0-2.1)	0.4%	1.4 (1.0-2.0)
≥ 37 Wk	0.2%	1.0 (reference)	0.2%	1.0 (reference)	0.3%	1.0 (reference)

Any medical disability

severely affecting

working capacity§

p<0.001

p<0.001

p<0.001

23 Wk to 27 wk 6 d	11.9%	4.4 (2.5-7.9)	8.0%	5.9 (3.2-11)	11.6%	21 (14-33)
28 Wk to 30 wk 6 d	10.4%	3.8 (3.0-4.9)	8.9%	5.8 (4.4-7.6)	4.9%	7.8 (5.2-12)
31 Wk to 33 wk 6 d	6.1%	2.2 (1.9-2.6)	3.4%	2.1 (1.6-2.7)	1.8%	2.6 (1.7-3.8)
34 Wk to 36 wk 6 d	3.4%	1.3 (1.1-1.4)	2.2%	1.5 (1.3-1.7)	1.1%	1.7 (1.3-2.1)
≥ 37 Wk	2.6%	1.0 (reference)	1.4%	1.0 (reference)	0.6%	1.0 (reference)

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\* All analyses are adjusted for sex, year of birth, multiple births, single motherhood, maternal age, mother's level of education, father's level of education, and immigrant parents.

† This category of diagnosis is extracted from the primary medical diagnoses registered in the National Insurance Scheme as the reasons for giving disability benefits (Web Table 1).

‡ Other major disabilities include blindness, low vision, hearing loss and epilepsy.

§ The working capacity was assessed permanently reduced by at least 50 percent due to any medical condition by the National Insurance Scheme at age 18 years or older. Children who died before their 18<sup>th</sup> birthday were excluded.

Web Table 3. Medical disabilities according to gestational age stratified by sex.\*

	<u>Males</u>			<u>Females</u>		
	Percent	RR (95% CI)	Trend	Percent	RR (95% CI)	Trend
Cerebral palsy†			p<0.001			p<0.001
23 Wk to 27 wk 6 d	10.5%	88 (58-134)		7.6%	66 (38-115)	
28 Wk to 30 wk 6 d	5.7%	42 (32-57)		6.3%	50 (37-68)	
31 Wk to 33 wk 6 d	1.9%	14 (10-18)		1.9%	15 (11-20)	
34 Wk to 36 wk 6 d	0.4%	2.7 (2.1-3.5)		0.3%	2.7 (2.0-3.6)	
≥ 37 Wk	0.1%	1.0 (reference)		0.1%	1.0 (reference)	
Mental retardation†			p<0.001			p<0.001
23 Wk to 27 wk 6 d	5.8%	14 (7.9-25)		2.9%	5.2 (1.7-16)	
28 Wk to 30 wk 6 d	1.7%	3.7 (2.2-6.2)		1.8%	4.8 (2.9-8.1)	

31 Wk to 33 wk 6 d	0.9%	1.9 (1.3-2.7)	1.0%	2.4 (1.7-3.6)
34 Wk to 36 wk 6 d	0.8%	1.7 (1.4-2.0)	0.6%	1.4 (1.1-1.7)
≥ 37 Wk	0.4%	1.0 (reference)	0.4%	1.0 (reference)

Disorders of psychological  
development, behavior  
and emotion†

p<0.001

p=0.005

23 Wk to 27 wk 6 d	3.7%	11 (5.3-22)	1.2%	9.3 (2.4-37)
28 Wk to 30 wk 6 d	1.2%	3.4 (1.8-6.4)	0.1%	1.1 (0.2-7.7)
31 Wk to 33 wk 6 d	0.5%	1.4 (0.9-2.4)	0.2%	1.5 (0.6-3.6)
34 Wk to 36 wk 6 d	0.5%	1.5 (1.2-1.9)	0.2%	1.5 (1.0-2.3)
≥ 37 Wk	0.3%	1.0 (reference)	0.1%	1.0 (reference)

Other major  
disabilities†‡

p<0.001

p<0.001

23 Wk to 27 wk 6 d	4.2%	20 (10-39)	4.1%	19 (9.2-40)
28 Wk to 30 wk 6 d	2.3%	9.6 (6.1-15)	2.1%	8.9 (5.3-15)
31 Wk to 33 wk 6 d	0.5%	2.2 (1.4-3.6)	0.6%	2.5 (1.5-4.1)
34 Wk to 36 wk 6 d	0.3%	1.4 (1.1-1.9)	0.4%	1.6 (1.2-2.1)
≥ 37 Wk	0.2%	1.0 (reference)	0.2%	1.0 (reference)

Any medical disability

severely affecting

working capacity§

p<0.001

p<0.001

23 Wk to 27 wk 6 d	13.3%	9.3 (6.6-13)	7.6%	5.2 (3.0-9.0)
28 Wk to 30 wk 6 d	8.2%	5.0 (4.0-6.3)	8.3%	4.6 (3.6-5.9)
31 Wk to 33 wk 6 d	3.9%	2.2 (1.8-2.6)	4.4%	2.3 (1.9-2.7)
34 Wk to 36 wk 6 d	2.4%	1.4 (1.3-1.6)	2.5%	1.3 (1.2-1.5)
≥ 37 Wk	1.6%	1.0 (reference)	1.7%	1.0 (reference)

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\* All analyses are adjusted for year of birth, multiple births, single motherhood, maternal age, mother's level of education, father's level of education, and immigrant parents.

† This category of diagnosis is extracted from the primary medical diagnoses registered in the National Insurance Scheme as the reasons for giving disability benefits (Web Table 1).

‡ Other major disabilities include blindness, low vision, hearing loss and epilepsy.

§ The working capacity was assessed permanently reduced by at least 50 percent due to any medical condition by the National Insurance Scheme at age 18 years or older. Children who died before their 18<sup>th</sup> birthday were excluded.

Web Table 4. Education, employment, income, biologic parenthood, social relations and criminality in relation to gestational age at birth stratified by sex.\*

	<u>Males</u>			<u>Females</u>		
	Percent	RR (95% CI)	Trend	Percent	RR (95% CI)	Trend
Completed high school†			p=0.03			p=0.06
23 Wk to 27 wk 6 d	62.6%	0.9 (0.7-1.1)		72.7%	1.0 (0.8-1.2)	
28 Wk to 30 wk 6 d	67.6%	1.0 (0.9-1.0)		72.4%	1.0 (0.9-1.1)	
31 Wk to 33 wk 6 d	70.0%	1.0 (0.9-1.0)		74.4%	1.0 (1.0-1.0)	
34 Wk to 36 wk 6 d	71.3%	1.0 (1.0-1.0)		73.5%	1.0 (1.0-1.0)	
≥ 37 Wk	73.8%	1.0 (reference)		77.1%	1.0 (reference)	
Completed University, bachelor's degree‡‡			p=0.08			p=0.04

23 Wk to 27 wk 6 d	20.2%	0.8 (0.5-1.3)	30.1%	0.8 (0.6-1.2)
28 Wk to 30 wk 6 d	22.7%	0.9 (0.7-1.0)	33.8%	0.9 (0.8-1.1)
31 Wk to 33 wk 6 d	26.1%	1.0 (0.9-1.1)	36.0%	1.0 (0.9-1.0)
34 Wk to 36 wk 6 d	26.8%	1.0 (0.9-1.0)	37.2%	1.0 (0.9-1.0)
≥ 37 Wk	28.9%	1.0 (reference)	40.6%	1.0 (reference)

Completed postgraduate

degree†§

p=0.04

p=0.06

23 Wk to 27 wk 6 d	6.4%	1.0 (0.4-2.6)	2.7%	0.5 (0.1-1.9)
28 Wk to 30 wk 6 d	5.9%	0.9 (0.6-1.3)	3.7%	0.8 (0.5-1.3)
31 Wk to 33 wk 6 d	5.3%	0.8 (0.7-1.0)	5.3%	1.0 (0.8-1.2)
34 Wk to 36 wk 6 d	6.9%	1.0 (0.9-1.1)	5.1%	0.9 (0.8-1.0)
≥ 37 Wk	7.6%	1.0 (reference)	6.4%	1.0 (reference)

Low job-related income¶

p<0.001

p<0.001

23 Wk to 27 wk 6 d	15.7%	1.0 (0.6-1.5)	29.9%	1.3 (1.0-1.7)
28 Wk to 30 wk 6 d	16.8%	1.1 (0.9-1.3)	30.3%	1.2 (1.1-1.3)
31 Wk to 33 wk 6 d	15.9%	1.1 (1.0-1.2)	26.5%	1.0 (1.0-1.1)
34 Wk to 36 wk 6 d	16.3%	1.1 (1.0-1.1)	26.3%	1.0 (1.0-1.1)
≥ 37 Wk	15.3%	1.0 (reference)	24.7%	1.0 (reference)

High job-related income||

p<0.001

p=0.002

23 Wk to 27 wk 6 d	25.6%	0.9 (0.7-1.2)	6.3%	0.6 (0.3-1.2)
28 Wk to 30 wk 6 d	27.1%	0.9 (0.8-1.0)	6.6%	0.7 (0.5-1.0)
31 Wk to 33 wk 6 d	28.5%	1.0 (0.9-1.0)	8.2%	0.9 (0.8-1.0)
34 Wk to 36 wk 6 d	28.9%	1.0 (0.9-1.0)	8.9%	1.0 (0.9-1.0)
≥ 37 Wk	30.2%	1.0 (reference)	9.5%	1.0 (reference)

Unemployed\*\*

p=0.88

p=0.18

23 Wk to 27 wk 6 d	19.5%	0.8 (0.5-1.1)	15.6%	0.9 (0.6-1.3)
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28 Wk to 30 wk 6 d	29.5%	1.1 (1.0-1.2)	19.3%	0.9 (0.8-1.1)
31 Wk to 33 wk 6 d	27.2%	1.0 (0.9-1.0)	21.9%	1.0 (0.9-1.1)
34 Wk to 36 wk 6 d	27.4%	1.0 (1.0-1.0)	20.9%	1.0 (0.9-1.0)
≥ 37 Wk	26.8%	1.0 (reference)	20.4%	1.0 (reference)

Received social

security benefits

p<0.001

p<0.001

23 Wk to 27 wk 6 d	19.5%	1.2 (0.9-1.7)	20.3%	1.1 (0.8-1.6)
28 Wk to 30 wk 6 d	20.7%	1.1 (1.0-1.2)	24.2%	1.2 (1.0-1.3)
31 Wk to 33 wk 6 d	20.0%	1.1 (1.0-1.2)	21.5%	1.0 (0.9-1.1)
34 Wk to 36 wk 6 d	18.7%	1.1 (1.0-1.1)	21.8%	1.1 (1.0-1.1)
≥ 37 Wk	16.5%	1.0 (reference)	18.6%	1.0 (reference)

Biologic parenthood† ††

p<0.001

p<0.001

23 Wk to 27 wk 6 d	19.5%	0.7 (0.4-1.0)	37.5%	0.9 (0.6-1.2)
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28 Wk to 30 wk 6 d	28.5%	0.9 (0.7-1.0)	45.4%	0.9 (0.8-1.0)
31 Wk to 33 wk 6 d	34.2%	0.9 (0.9-1.0)	50.1%	0.9 (0.9-1.0)
34 Wk to 36 wk 6 d	35.1%	1.0 (0.9-1.0 )	52.0%	1.0 (0.9-1.0)
≥ 37 Wk	35.4%	1.0 (reference)	51.2%	1.0 (reference)

Married or cohabitating

p<0.001

p<0.001

23 Wk to 27 wk 6 d	4.9%	0.4 (0.2-0.8)	14.8%	0.9 (0.6-1.3)
28 Wk to 30 wk 6 d	11.5%	0.9 (0.7-1.1)	17.7%	0.9 (0.7-1.0)
31 Wk to 33 wk 6 d	12.5%	0.9 (0.8-0.9)	20.9%	0.9 (0.9-1.0)
34 Wk to 36 wk 6 d	13.9%	0.9 (0.9-1.0 )	21.5%	1.0 (0.9-1.0)
≥ 37 Wk	14.6%	1.0 (reference)	22.1%	1.0 (reference)

Divorced

p=0.002

p=0.001

23 Wk to 27 wk 6 d	0%	‡‡	1.6%	0.8 (0.2-2.9)
28 Wk to 30 wk 6 d	0.7%	0.5 (0.2-1.1)	2.3%	0.7 (0.4-1.2)

31 Wk to 33 wk 6 d	1.5%	0.8 (0.6-1.1)	2.6%	0.7 (0.5-0.9)
34 Wk to 36 wk 6 d	1.6%	0.9 (0.8-1.0)	3.3%	0.9 (0.9-1.0)
≥ 37 Wk	1.7%	1.0 (reference)	3.3%	1.0 (reference)

Overall criminality p=0.42 p=0.69

23 Wk to 27 wk 6 d	15.4%	1.0 (0.7-1.6)	3.9%	1.4 (0.6-3.3)
28 Wk to 30 wk 6 d	14.8%	1.0 (0.8-1.1)	3.4%	1.0 (0.6-1.6)
31 Wk to 33 wk 6 d	16.0%	1.0 (0.9-1.1)	2.8%	0.9 (0.7-1.2)
34 Wk to 36 wk 6 d	15.5%	1.0 (1.0-1.1)	2.9%	1.0 (0.9-1.1)
≥ 37 Wk	14.4%	1.0 (reference)	2.8%	1.0 (reference)

Received a sentence for violence

or criminal damage p=0.62 p=0.96

23 Wk to 27 wk 6 d	4.1%	0.8 (0.3-2.1)	0%	‡‡
28 Wk to 30 wk 6 d	3.6%	0.9 (0.6-1.2)	0%	‡‡

31 Wk to 33 wk 6 d	4.6%	1.0 (0.9-1.2)	0.5%	1.5 (0.9-2.5)
34 Wk to 36 wk 6 d	4.3%	1.0 (0.9-1.1)	0.4%	1.0 (0.7-1.3)
≥ 37 Wk	4.1%	1.0 (reference)	0.3%	1.0 (reference)

Received a sentence

for drug felony

p=0.57

p=0.74

23 Wk to 27 wk 6 d	4.9%	0.9 (0.4-2.2)	3.1%	2.6 (1.0-6.7)
28 Wk to 30 wk 6 d	4.8%	1.1 (0.8-1.5)	1.4%	1.2 (0.6-2.3)
31 Wk to 33 wk 6 d	4.6%	1.0 (0.9-1.2)	1.0%	0.8 (0.5-1.2)
34 Wk to 36 wk 6 d	4.5%	1.0 (0.9-1.1)	1.3%	1.0 (0.9-1.2)
≥ 37 Wk	4.3%	1.0 (reference)	1.2%	1.0 (reference)

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\* People receiving disability benefits for medical reasons were excluded from these analyses. All analyses are adjusted for year of birth, multiple births, single motherhood, maternal age, mother's level of education, father's level of education, and immigrant status of parents.

†A Cox regression model was used for estimation since log-binomial regression did not converge.

‡ Persons born later than 1980 were excluded from this analysis.

§ Persons born later than 1978 were excluded from this analysis.

¶ Low job-related income was defined as a job-related yearly income that was lower than the 20<sup>th</sup> percentile for persons born during the same year.

|| High job-related income was defined as a job-related yearly income that was higher than the 80<sup>th</sup> percentile for persons born during the same year.

\*\* This category includes persons who had been registered at any time as unemployed by the Norwegian Employment Service.

†† This category includes persons who were registered as a biologic mother or father in The Medical Birth Registry of Norway.

‡‡ Relative risks could not be reliably calculated because the numbers in the cells were too small