Supplementary material

The impact of parity on life course blood pressure trajectories: The HUNT Study in Norway.

Supplemental Table 1. Descriptive characteristics of female HUNT participants born in the eligible birth cohorts 1940-1974, by inclusion status

Characteristics	Included in the analyses (n=23,438)	Excluded from the analyses (n=5400)
Birthyear, median (IQR)	1958 (1951 – 1965)	1945 (1942 - 1956)
Age at last HUNT participation, median (IQR)	45 (37 - 54)	53 (35 - 64)
Ever smoked daily, n (% of non-missing)		
No	9424 (40)	1582 (37)
Yes	14,014 (60)	2658 (63)
Missing, n (%)	0	1160 (22)
Education, n (% of non-missing)		
Lower Secondary	4260 (18)	1744 (43)
Upper Secondary	10875 (46)	1481 (37)
Tertiary	8303 (35)	831 (21)
Missing, n (%)	0	1344 (25)
Ever used oral contraceptives, n (% of non-missing)[*]		
No	5073 (27)	1680 (52)
Yes	13785 (73)	1572 (48)
Missing, n (%)	4580 (20)	2148 (40)
Ever used blood pressure medication, n (% of non-missing)		
No	20,796 (89)	4391 (81)
Yes	2638 (11)	1004 (19)
Missing, n (%)	4 (0.02)	5 (0.1)
Parity, n (%)		
Nulliparous	1925 (8)	269 (5)
Parous	21,513 (92)	5131 (95)
1 birth	2362 (10)	409 (8)
2 births	9500 (41)	1666 (31)
3 or more births	9651 (41)	3053 (57)
unknown number of births	0	3 (0.1)
Age at 1st birth, median (IQR)[**]	23 (20 - 26)	21 (19 - 23)
Missing, n (%)	0	1162 (22)
Year of 1st birth, median (IQR)[**]	1981 (1973–1990)	1966 (1964 - 1980)
Missing, n (%)	0	1590 (29)

[*] Queried at HUNT2 and HUNT3

[**] For women whose first birth was prior to the inception of Medical Birth Registry of Norway in 1967, information on age and year of first birth is based on the women's report at participation in HUNT

Supplemental Table 2. Predicted increase per year in systolic and diastolic pressure by age at follow-up in parous and nulliparous women.

	Nulliparous		Parous*		Difference		
Age interval	Blood pressure[†]	95% CI	Blood pressure[†]	95% CI	Blood pressure[†]	95% CI	p-value
Systolic (mmHg/year)							
20–23 years	0.242	[0.003 , 0.480]	0.012	[-0.076 , 0.100]	-0.230	[-0.483 , 0.023]	0.075
24–30 years	0.242	[0.003 , 0.480]	0.134	[0.047 , 0.220]	-0.108	[-0.361 , 0.144]	0.401
30–40 years	0.255	[0.098 , 0.412]	0.430	[0.383 , 0.476]	0.174	[0.012 , 0.337]	0.035
40–50 years	0.751	[0.584 , 0.918]	0.839	[0.792 , 0.886]	0.089	[-0.083 , 0.260]	0.310
50–60 years	0.781	[0.535 , 1.028]	0.836	[0.765 , 0.908]	0.055	[-0.198 , 0.308]	0.671
Diastolic (mmHg/year)							
20–23 years	0.478	[0.304 , 0.651]	0.280	[0.216 , 0.344]	-0.198	[-0.382 , -0.014]	0.035
24–30 years	0.478	[0.304 , 0.651]	0.364	[0.302 , 0.427]	-0.114	[-0.297 , 0.070]	0.226
30–40 years	0.312	[0.204 , 0.421]	0.437	[0.405 , 0.469]	0.125	[0.013 , 0.237]	0.029
40–50 years	0.379	[0.268 , 0.490]	0.435	[0.404 , 0.467]	0.056	[-0.058 , 0.170]	0.335
50–60 years	0.181	[0.017 , 0.344]	0.122	[0.075 , 0.168]	-0.059	[-0.226 , 0.109]	0.491

* Predicted for parous women having their first birth at age 23, corresponding to median age at first birth in our study population.

[†] Estimates are based on the trajectory models depicted in Figure 2a and 2b and adjusted for age, HUNT survey, education and ever daily smoking.

Supplemental Table 3. Predicted mean systolic and diastolic blood pressure by age at follow-up in parous and nulliparous women.

	Nulliparous		Parous*		Difference		
	Blood pressure[†]	95% CI	Blood pressure[†]	95% CI	Blood pressure[†]	95% CI	p-value
Systolic (mmHg)							
20 years	119.44	[117.69 , 121.19]	119.68	[119.03 , 120.33]	0.24	[-1.58 , 2.05]	0.797
			1st birth in parous women occurs at age 23				
30 years	121.86	[120.75 , 122.97]	117.30	[116.95 , 117.65]	-4.56	[-5.70 , -3.42]	<0.001
40 years	124.41	[123.43 , 125.40]	121.60	[121.32 , 121.88]	-2.82	[-3.84 , -1.79]	<0.001
50 years	131.92	[130.56 , 133.28]	129.99	[129.58 , 130.40]	-1.93	[-3.33 , -0.53]	0.007
60 years	139.73	[137.59 , 141.88]	138.35	[137.62 , 139.09]	-1.38	[-3.56 , 0.80]	0.215
Diastolic (mmHg)							
20 years	68.85	[67.54 , 70.17]	69.07	[68.59 , 69.56]	0.22	[-1.14 , 1.58]	0.750
			1st birth in parous women occurs at age 23				
30 years	73.63	[72.83 , 74.43]	70.46	[70.21 , 70.71]	-3.17	[-3.99 , -2.35]	<0.001
40 years	76.75	[76.09 , 77.41]	74.83	[74.64 , 75.02]	-1.92	[-2.61 , -1.23]	<0.001
50 years	80.54	[79.66 , 81.42]	79.18	[78.92 , 79.45]	-1.36	[-2.26 , -0.46]	0.003
60 years	82.35	[80.98 , 83.72]	80.40	[79.94 , 80.87]	-1.95	[-3.34 , -0.55]	0.006

*Predicted for parous women having their first birth at age 23, corresponding to median age at first birth in our study population.

[†] Estimates are based on the trajectory models depicted in Figure 2a and 2b and adjusted for age, HUNT survey, education and ever daily smoking.

Supplemental Table 4. Mean within-woman change in systolic and diastolic blood pressure between HUNT2 and HUNT3 (n=1048).

No. of births between HUNT2 and HUNT3	n	Systolic blood pressure (mmHg)			Diastolic blood pressure (mmHg)		
		change*	95% CI	p-value	change*	95% CI	p-value
None	426	ref.			ref.		
Any	620	-3.99	[-5.98 , -1.99]	<0.001	-3.04	[-4.43 , -1.64]	<0.001
1	139	-3.57	[-6.20 , -0.94]	0.008	-3.05	[-4.89 , -1.20]	0.001
2	334	-3.28	[-5.53 , -1.04]	0.004	-2.53	[-4.10 , -0.96]	0.002
≥ 3	147	-6.47	[-9.26 , -3.68]	<0.001	-4.34	[-6.28 , -2.39]	<0.001

*estimates are adjusted for age and education at baseline (HUNT2) and change in smoking status from HUNT2 to HUNT3.

Supplemental Table 5. Mean within-woman change in blood pressure (mmHg) due to pregnancy among 754[*] women who participated in both HUNT2 and HUNT3 and had complete data on all covariates.

No. of births between HUNT2 and HUNT3	Model 1[†]			Model 2[‡]			Model 3[§]			Model 4[‖]			Model 5[#]		
	change	95% CI	p-value	change	95% CI	p-value	change	95% CI	p-value	change	95% CI	p-value	change	95% CI	p-value
Systolic (mmHg)															
None (309)	ref.			ref.			ref.			ref.			ref.		
Any (431)	-3.25	[-5.61, -0.89]	0.007	-3.07	[-5.46, -0.69]	0.012	-3.13	[-5.52, -0.74]	0.010	-2.63	[-5.06, -0.21]	0.033	-2.47	[-4.86, -0.08]	0.043
1 (92)	-2.62	[-5.83, 0.59]	0.110	-2.54	[-5.77, 0.68]	0.123	-2.62	[-5.85, 0.62]	0.113	-2.12	[-5.38, 1.13]	0.201	-2.06	[-5.28, 1.15]	0.208
2 (226)	-2.63	[-5.34, 0.07]	0.056	-2.48	[-5.20, 0.24]	0.073	-2.52	[-5.24, 0.20]	0.069	-2.02	[-4.77, 0.73]	0.150	-1.92	[-4.63, 0.79]	0.165
≥ 3 (113)	-5.39	[-8.62, -2.16]	0.001	-5.15	[-8.42, -1.87]	0.002	-5.22	[-8.49, -1.94]	0.002	-4.72	[-8.01, -1.42]	0.005	-4.29	[-7.55, -1.03]	0.010
Diastolic (mmHg)															
None (309)	ref.			ref.			ref.			ref.			ref.		
Any (431)	-2.33	[-3.90, -0.75]	0.004	-2.37	[-3.96, -0.78]	0.004	-2.37	[-3.96, -0.77]	0.004	-2.04	[-3.66, -0.42]	0.014	-2.00	[-3.62, -0.39]	0.015
1 (92)	-2.17	[-4.31, -0.03]	0.047	-2.26	[-4.42, -0.11]	0.040	-2.21	[-4.38, -0.05]	0.045	-1.89	[-4.07, 0.29]	0.089	-1.88	[-4.05, 0.30]	0.091
2 (226)	-1.83	[-3.63, -0.02]	0.047	-1.86	[-3.67, -0.04]	0.045	-1.86	[-3.68, -0.05]	0.044	-1.53	[-3.37, 0.30]	0.102	-1.51	[-3.35, 0.32]	0.107
≥ 3 (113)	-3.60	[-5.76, -1.45]	0.001	-3.69	[-5.88, -1.50]	0.001	-3.72	[-5.91, -1.53]	0.001	-3.40	[-5.61, -1.20]	0.002	-3.31	[-5.51, -1.10]	0.003

[*] Sample size is lower than in Supplemental Table 3 predominantly due to incomplete information on oral contraceptive use from questionnaires retrieved by mail.

[†] estimates are adjusted for age at baseline (HUNT2).

[‡] estimates are adjusted for age and education at baseline (HUNT2).

[§] estimates are adjusted for age and education at baseline (HUNT2) and change in smoking status from HUNT2 to HUNT3.

[‖] estimates are adjusted for age and education at baseline (HUNT2) and change in smoking status and oral contraceptive use from HUNT2 to HUNT3.
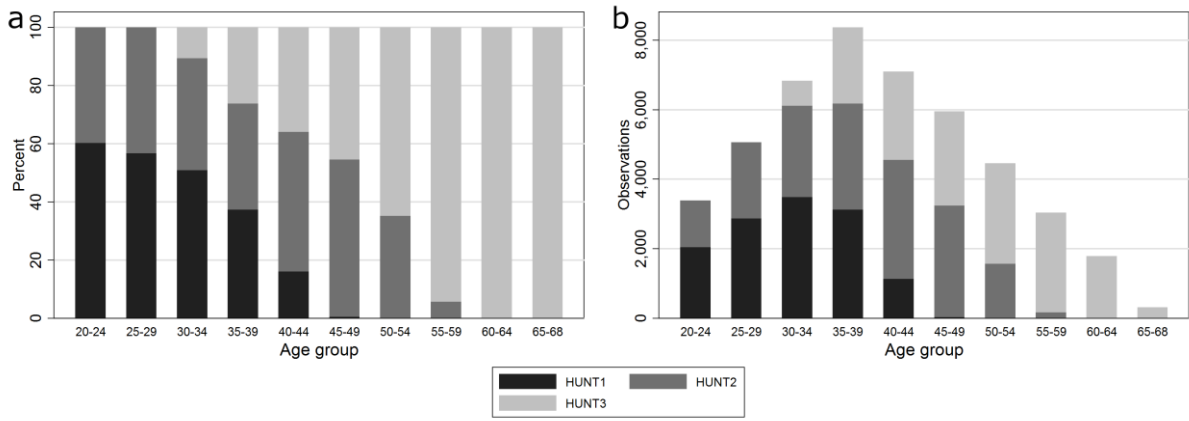
[#] estimates are adjusted for age and education at baseline (HUNT2) and change in smoking status, oral contraceptive use and BMI from HUNT2 to HUNT3.

Supplemental Table 6. Mean within-woman change in systolic and diastolic blood pressure between HUNT2 and HUNT3 by breastfeeding categories (n=702).[*]
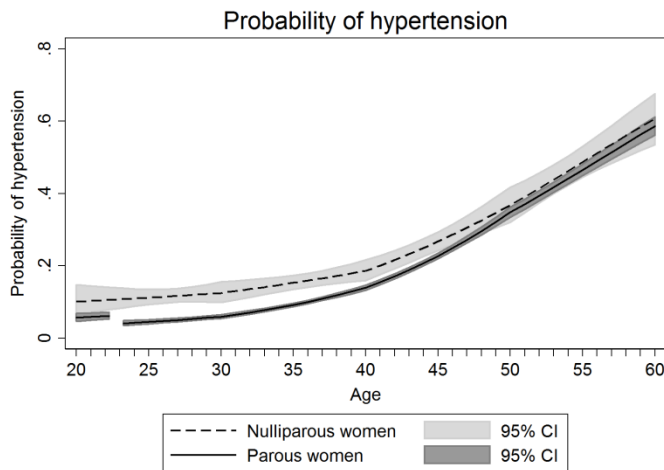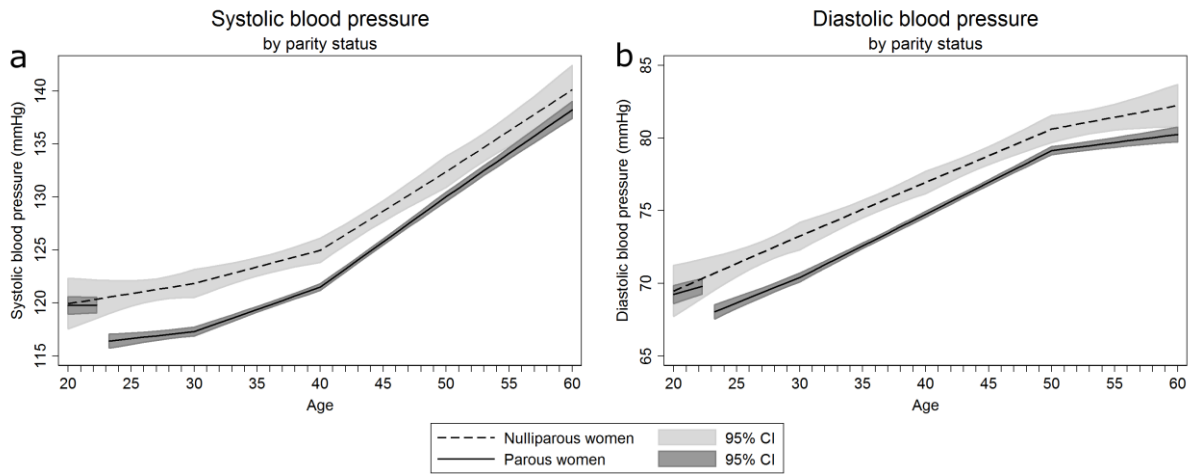
Breastfeeding status of first pregnancy	N	Systolic blood pressure (mmHg)			Diastolic blood pressure (mmHg)		
		change[†]	95% CI	p-value	change[†]	95% CI	p-value
No pregnancy	320	reference			reference		
No breastfeeding	15	-2.89	[-9.90 , 4.13]	0.420	-2.85	[-7.60 , 1.90]	0.239
> 0 to < 3 months	26	-2.35	[-7.80 , 3.09]	0.397	-2.72	[-6.40 , 0.97]	0.149
3 to 6 months	41	-1.42	[-5.93 , 3.10]	0.539	-1.11	[-4.17 , 1.95]	0.476
> 6 months	300	-2.71	[-5.32 , -0.10]	0.042	-2.46	[-4.23 , -0.70]	0.006

[*]sample is smaller than in Supplemental Table 4 due to missing information on breastfeeding length.

[†]estimates are adjusted for age and education at baseline (HUNT2) and change in smoking status, oral contraceptive use and BMI from HUNT2 to HUNT3.
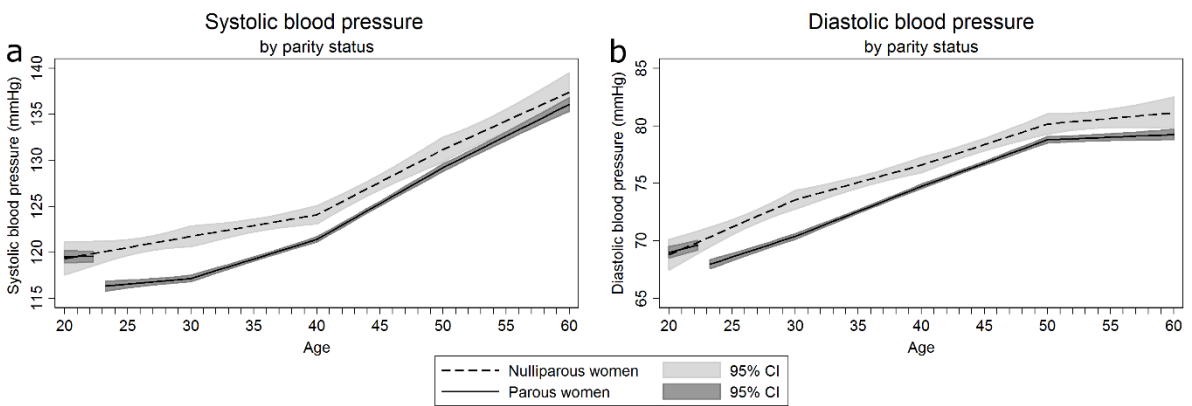
Supplemental Figure 1. **Proportion (a) and number (b) of blood pressure measurements according to age at participation and HUNT survey.**
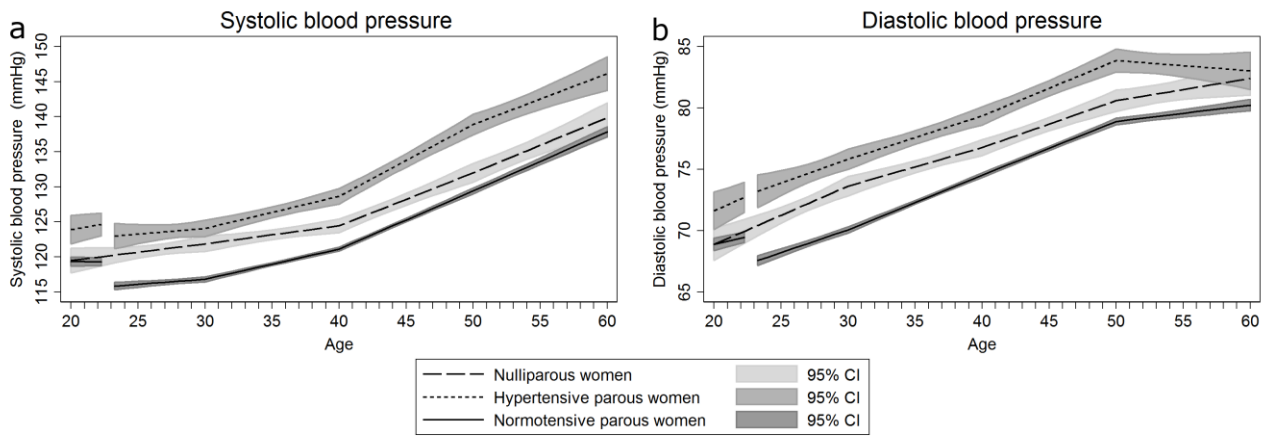

Supplemental Figure 2. Predicted probability of hypertension by age for nulliparous and parous women. The gap in the graph for parous women corresponds to the 1st pregnancy and 3-month postpartum period with the 1st birth at age 23. Estimates are adjusted for age, HUNT survey, education and ever daily smoking.

Supplemental Figure 3. **Mean systolic and diastolic blood pressure life course trajectories for nulliparous and parous women.** This strictly longitudinal sensitivity analysis includes only women with at least two blood pressure observations (n=15,233). Trajectories are drawn for women with covariates fixed at their means and with gaps in the graphs of parous women corresponding to the 1st pregnancy and 3-month postpartum period with the 1st birth at age 23. Estimates are adjusted for age, HUNT survey, education and ever daily smoking.

Supplemental Figure 4. **Mean systolic (a) and diastolic (b) blood pressure life course trajectories for nulliparous and parous women using original blood pressure data.** This sensitivity analysis is based on the original blood pressure values without adding constants in women who used antihypertensive medication, as was done in the main analysis. Trajectories are drawn for women with covariates fixed at their means and with gaps in the graphs of parous women corresponding to the 1st pregnancy and 3-month postpartum period with the 1st birth at age 23. Estimates are adjusted for age, HUNT survey, education and ever daily smoking.

Supplemental Figure 5. **Mean systolic (a) and diastolic (b) blood pressure life course trajectories for nulliparous women and parous women with or without a hypertensive disorder in their first pregnancy.** Trajectories are drawn for women with covariates fixed at their means and with gaps in the graphs of parous women corresponding to the 1st pregnancy and 3-month postpartum period with the 1st birth at age 23. Estimates are adjusted for age, HUNT survey, education and ever daily smoking.