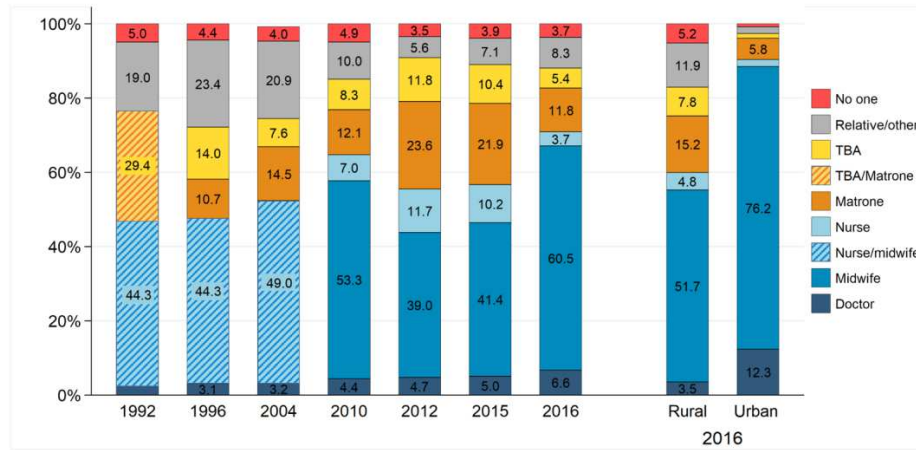


Supplementary Appendix 2: Supplementary tables and figures

Figure S1. Highest reported birth attendant by DHS recall period midpoint (all live births in two-year recall period)



Note: skilled birth attendant categories (doctor, midwife, nurse) in blue; "nurse" and "midwife" were combined in a single response option until the 2011 DHS, and "matrone" was included under "traditional birth attendant (TBA)" until 1997; percentages <3% not labelled; the midpoint corresponds to the calendar year of the halfway point of the data collection period for each survey

Abbreviations: DHS – Demographic and Health Survey; TBA – traditional birth attendant

Figure S2. Place of birth and highest reported birth attendant according to DHS survey mid-point (1,000s births, all live births in two-year recall period)

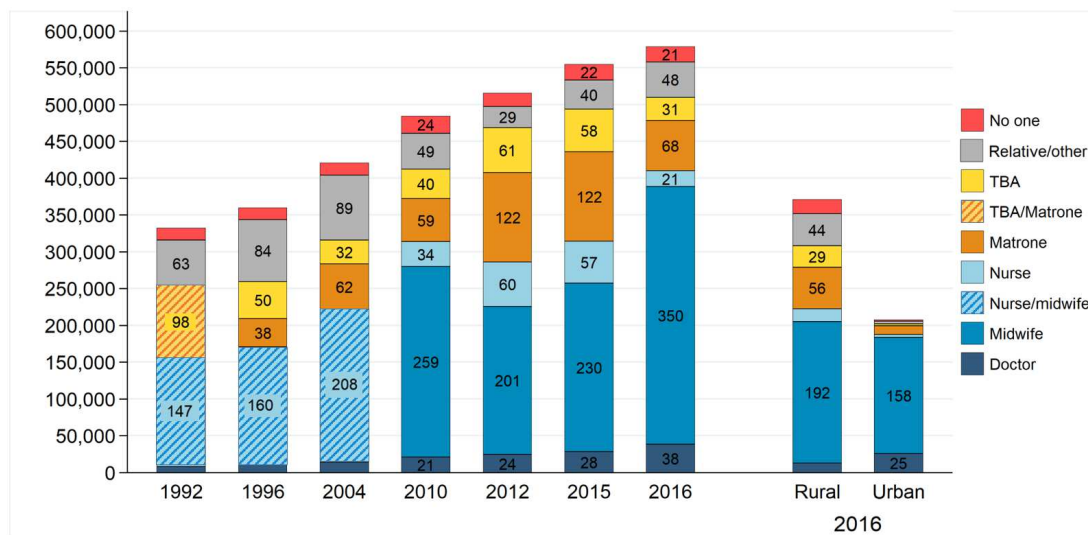
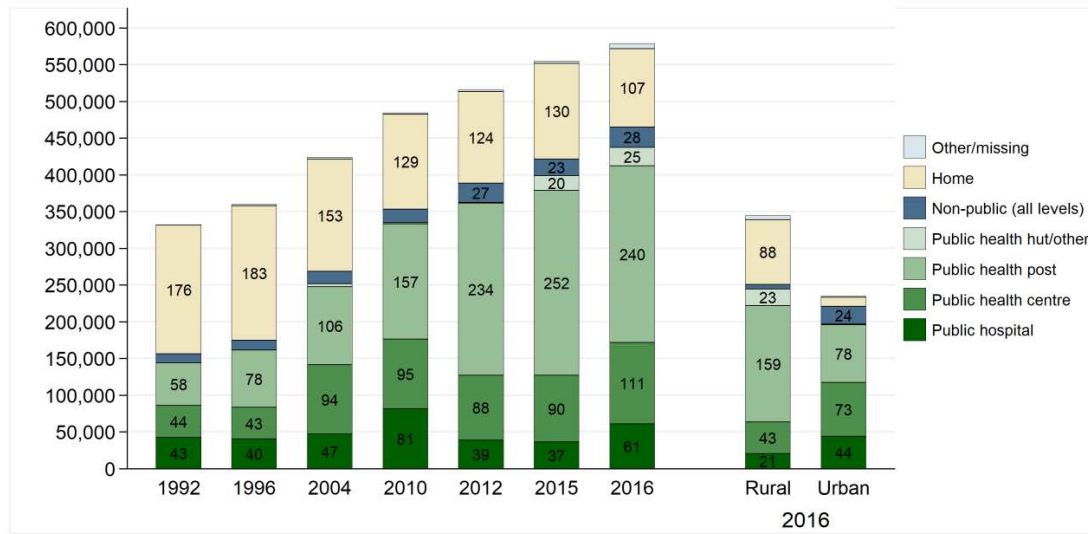
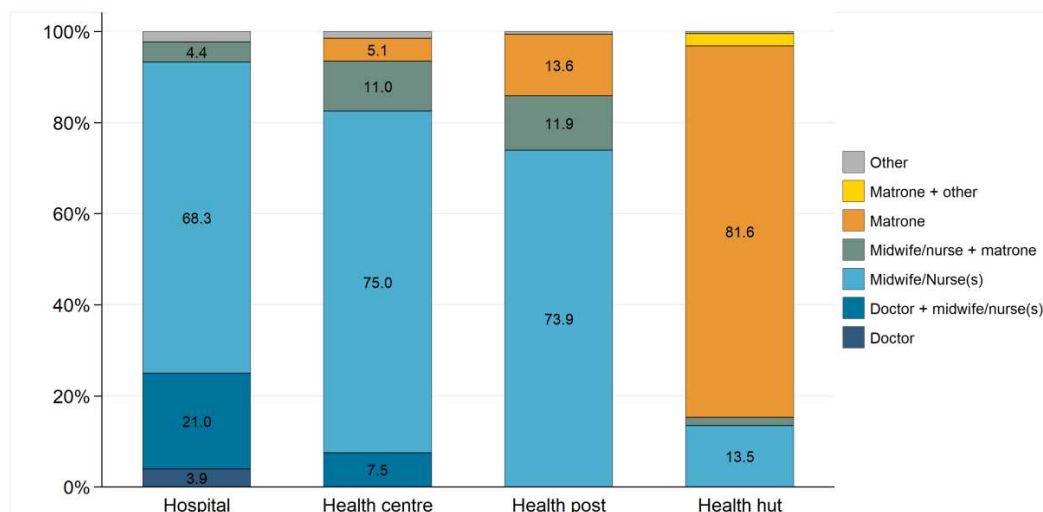


Figure S3. Reported birth attendant(s) according to public facility level in 2017 (all live births in two-year recall period)



Note: percentages <3% not labelled

Table S1. Corrected driving times used for facilities with modelled driving times to nearest caesarean facility >3 hours

Region	OSM modelled driving time (hours)	Driving time used in analysis, as reported by District Medical Officers (hours)
Kaffrine	3.38	1.5
	3.50	1.5
	3.06	1.5
Kédougou	4.07	Unknown
Louga	5.17	1.25
Matam	3.39	1.67
	5.73	2
	5.59	2
	6.70	2.33
	3.53	2.5
	3.04	3
Saint-Louis	3.14	1.33
	4.62	1.47
	4.65	1.5
	4.65	1.72
	4.66	1.75
	4.69	1.75
	4.87	2

Table S2. Change in place of birth between 1992 and 2016 among all live births in two-year recall period, Senegal

	Urban % (95% CI)			Rural % (95% CI)			All births % (95% CI)			
	1992	2016	p-value	1992	2016	p-value	1992	2016	Absolute change in percentage	p-value
N births	772	1,614	-	1,489	3,259	-	2,261	4,873	-	-
Public hospital	28.6 (23.7-34.2)	18.7 (15.6-22.1)	0.001	4.6 (3.3-6.4)	6.0 (4.8-7.4)	0.199	12.8 (10.5-15.5)	10.5 (9.1-12.1)	-2.3	0.113
Public health centre	27.9 (23.5-32.7)	31.3 (27.2-35.7)	0.303	5.5 (4.1-7.4)	12.4 (10.0-15.2)	<0.001	13.1 (11.0-15.6)	19.2 (16.8-21.7)	6.1	0.001
Public health post	15.5 (12.7-18.8)	33.4 (29.4-37.7)	<0.001	18.3 (13.5-24.3)	46.1 (42.1-50.1)	<0.001	17.3 (13.9-21.4)	41.5 (38.5-44.6)	24.2	<0.001
Public health hut	-	0.4 (0.2-0.8)	-	-	6.6 (4.8-9.0)	-	-	4.4 (3.2-6.0)	-	-
All public facilities	72.0 (67.2-76.4)	83.7 (80.4-86.6)	<0.001	28.4 (22.4-35.3)	71.0 (67.2-74.6)	<0.001	43.3 (38.4-48.4)	75.6 (72.8-78.2)	32.3	<0.001
Non-public facilities	9.6 (6.9-13.1)	10.3 (7.9-13.4)	0.730	0.6 (0.3-1.4)	1.7 (1.0-2.8)	0.038	3.7 (2.7-5.1)	4.8 (3.7-6.2)	1.1	0.229
Home	18.4 (14.6-22.9)	5.3 (4.0-7.0)	<0.001	70.7 (63.9-76.8)	25.7 (22.2-29.6)	<0.001	52.9 (47.7-57.9)	18.4 (15.9-21.1)	-34.5	<0.001
Other	0	0.7 (0.3-1.5)	0.095	0.3 (0.1-0.7)	1.6 (1.1-2.2)	<0.001	0.2 (0.1-0.5)	1.3 (0.9-1.7)	1.1	<0.001
Total facility births	81.6 (77.1-85.4)	94.0 (92.1-95.5)	<0.001	29.0 (23.0-35.9)	72.7 (68.7-76.3)	<0.001	47.0 (41.9-52.1)	80.3 (77.5-82.9)	33.3	<0.001
Caesarean section rate	3.9 (2.4-6.3)	10.2 (8.1-12.7)	<0.001	1.7 (1.0-3.0)	3.7 (2.9-4.7)	0.011	2.4 (1.7-3.5)	6.0 (5.0-7.1)	3.6	<0.001

Note: non-public facilities include private for-profit, private not-for-profit, and religious facilities (all levels); CI – 95% confidence interval

Table S3. Delivery care and facility readiness indicators by region

	West		Centre				North			South-East		South		
	Dakar	Thiès	Diourbel	Fatick	Kaffrine	Kaolack	Saint-Louis	Louga	Matam	Tamba-counda	Kédou-gou	Kolda	Sédhiou	Ziguinchor
Births in urban areas (%) – 2017	92.9	39.3	12.4	14.7	13.9	27.6	36.9	16.9	21.8	15.4	22.1	20.4	14.1	37.2
Fertility indicators														
Number of births (%) – 2015	130,032 (18%)	87,740 (12%)	93,812 (13%)	38,078 (5%)	40,930 (6%)	61,229 (8%)	53,035 (7%)	47,507 (6%)	33,570 (5%)	41,223 (6%)	9,365 (1%)	44,076 (6%)	26,218 (4%)	24,153 (3%)
Fertility rate - 2015-2017	3.0	4.6	5.8	5.2	6.2	5.2	4.7	5.1	5.3	5.8	6.4	5.5	6.4	4.6
Delivery care utilisation indicators														
Facility births (%)	95.5	87.6	79.2	84.3	73.8	79.8	80.8	74.8	72.8	55.7	52.0	70.6	61.7	89.8
Skilled attendance at birth (SBA, %)	96.0	77.8	70.3	70.9	47.5	66.1	72.7	68.8	65.9	47.4	46.4	45.7	52.7	73.3
SBA among facility births (%)	98.3	88.5	86.9	81.9	63.8	82.1	89.0	91.1	89.9	83.0	88.6	63.5	84.7	81.0
Public hospital births (%)	20.5	10.3	9.5	6.4	2.0	4.6	15.9	9.6	5.4	4.9	5.4	5.4	4.9	18.2
Public health centre births (%)	33.4	25.6	14.0	17.9	10.9	12.4	13.9	16.2	10.5	14.7	24.8	18.6	8.2	14.2
Public health post births (%)	27.3	43.4	47.2	52.8	47.8	54.5	47.0	43.9	53.0	31.4	19.1	29.3	44.3	46.3
Public health hut births (%)	0.0	3.4	4.6	3.2	12.9	4.4	3.2	3.6	3.3	2.5	2.8	16.8	4.4	8.5
Private facility births (%)	14.3	5.0	3.9	3.9	0.2	4.0	0.9	1.5	0.6	2.2	0.0	0.6	0.0	2.7
Home births (%)	3.6	11.9	17.7	14.4	24.8	19.6	17.8	24.3	26.8	42.9	46.8	28.1	37.5	8.7
Caesarean section rate (%)	14.2	4.8	4.6	4.6	2.6	2.9	5.0	5.4	2.8	4.0	4.2	3.8	2.4	4.8
Neonatal mortality														
Neonatal mortality rate (per 1,000 live births)	17.8	22.4	28.2	28.6	16.5	31.1	28.8	31.6	36.2	22.6	34.7	39.4	30.9	36.6
Staffing of skilled birth attendants (SBA)														
Public hospitals (median number of SBA employed)	141	56	69	39	37	72	128	16	38	71	- ^a	- ^a	38	124
Public health centres (median number of SBA employed, IQR)	28 (19-38)	19 (18-20)	24 (21-27)	16 (12-17)	11 (6-15)	21 (12-30)	11 (7-15)	11 (9-14)	5 (2-11)	11 (5-17)	12 (11-13)	18 (18-18)	12 (11-13)	16 (13-19)
Public health posts (median number of SBA employed, IQR)	6 (5-6)	2 (2-3)	2 (2-3)	2 (1-2)	2 (2-4)	2 (2-3)	2 (1-2)	2 (1-2)	2 (1-2)	2 (1-2)	2 (2-2)	2 (1-3)	2 (2-2)	2 (1-3)
EmONC readiness														
BEmONC-1 readiness (% facilities)	24.0	5.9	1.2	8.1	11.6	9.7	5.3	6.0	11.8	5.4	0	4.9	0	3.2
Full CEmONC readiness, including BEmONC-1 (% facilities)	5.4	0.6	1.2	0	1.1	0.8	0	0	0.9	0	0	0	0	0
CEmONC but not BEmONC (% facilities)	2.6	0.6	1.2	0.7	0	1.6	0.7	0.8	0	0.8	0	0	1.3	1.2
Referral readiness														
Adequate referral capacity (% facilities)	79.2	37.3	81.5	57.9	38.8	37.0	31.8	37.3	41.4	29.8	25.2	12.4	85.7	90.8

	West		Centre				North			South-East		South		
	Dakar	Thiès	Diourbel	Fatick	Kaffrine	Kaolack	Saint-Louis	Louga	Matam	Tamba-counda	Kédougou	Kolda	Sédhiou	Ziguinchor
Median distance from facility without caesarean capacity to nearest facility with caesarean capacity in km (IQR, excluding health huts)	3 (2-8)	19 (11-31)	23 (10-33)	38 (19-62)	39 (28-53)	35 (22-49)	30 (12-49)	35 (25-51)	49 (31-75)	52 (28-66)	75 (33-100)	71 (29-99)	52 (36-70)	52 (27-64)
Median driving time from facility without caesarean capacity to nearest facility with caesarean capacity in min (IQR, excluding health huts)	5 (3-10)	27 (15-38)	26 (14-40)	48 (26-79)	45 (32-70)	50 (33-65)	32 (13-63)	45 (29-59)	60 (31-86)	59 (33-89)	100 (38-131)	76 (37-103)	63 (45-77)	57 (36-70)
Within 1hr of nearest facility with caesarean capacity (% facilities, excluding health huts)	100	94	90	64	66	63	74	76	53	52	33	37	46	55
Combined EmONC and referral readiness														
Births in facilities providing minimum safe childbirth conditions (BEmONC-1 with either CEmONC or acceptable referral capacity; % births in public facilities)	36.7	9.0	6.3	10.9	18.2	22.7	5.8	17.6	15.2	10.5	0	5.7	0	2.8

^aNo hospitals included in the SPA sample

Table S4. Provision of childbirth care and caesarean services in public facilities in Senegal (SPA 2017)

	N	Providing delivery care (% all facilities)	Providing caesarean sections (% facilities providing delivery care services)
Hospital	19	17 (85.7)	16 (93.8)
Health centre	50	42 (83.2)	5 (12.3)
Health post	246	233 (92.6)	0 (0)
Hospitals, health centres and health posts	315	292 (91.7)	21 (2.8)
Health hut	385	184 (46.3)	-

Table S5. Number of staff by skilled birth attendant cadres in public facilities providing childbirth care in Senegal (2017)

	N	Median number of providers employed in facility (IQR)				% employing at least one cadre member			
		Doctor	Midwife	Nurse	All SBA	Doctor	Midwife	Nurse	All SBA
Hospital (all urban)	17	15 (7-30)	13 (11-20)	27 (20-55)	58 (38-124)	94	100	100	100
Health centre (urban)	23	3 (2-5)	6 (4-8)	8 (6-15)	19 (16-26)	100	87	100	100
Health centre (rural)	19	2 (2-3)	4 (3-5)	4 (3-7)	11 (7-13)	89	88	100	100
Health post (urban)	30	0 (0-0)	2 (1-3)	2 (2-3)	4 (3-6)	0	95	100	100
Health post (rural)	203	0 (0-0)	1 (0-1)	1 (1-1)	2 (1-2)	2	70	98	100
Hospitals, health centres and health posts	292	0 (0-0)	1 (1-1)	1 (1-2)	2 (2-3)	10	76	99	100
Health hut (all rural)	184	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0	0	0	0

Note: IQR: interquartile range; SBA: Skilled Birth Attendant (including doctors, midwives, and nurses)