HEALTH ECONOMICS AND FINANCING | ARTICLE
https://doi.org/10.1071/AH22108
Australian Health Review

Change in costs to funders of maternity care over time: an analysis of Queensland births

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ABSTRACT

Objective. To describe change in costs to different funders over time for women giving birth in Queensland between 2012 and 2018. **Methods.** A whole-of-population linked administrative dataset was used that contained all health service use in Queensland for women who gave birth between 1 July 2012 and 30 June 2018 and their babies. Aggregated costs for mother and baby from pregnancy to 12 months postpartum were used to compare the change in costs to funders over time. **Results.** There was an increase in mean total cost to all funders per birth in the public system and private system from 2012 to 2018. North West Hospital and Health Service (HHS) had the highest mean total cost (in Australian dollars) in 2018 (A$42 353), while home births had the lowest (A$6105). For the majority of HHSs the proportion of births with a positive birth outcome (as defined by a composite outcome measure) has remained largely static or declined during this time period. Cairns and Hinterland HHS and Townsville HHS had the largest declines of 15% and 16% respectively, while mean total cost to all funders rose 36.39% and 46.41%, respectively. **Conclusions.** There has been an increase over time across Queensland in the cost of childbirth in public hospitals and in the private system, while the cost of home birth has remained static. For most HHSs this increase in cost is also associated with little change or a decline in the percentage of births with a positive outcome. Increases in cost are therefore not being translated into better outcomes for women and their babies. Routine performance monitoring of cost, quality and safety should be adopted to ensure the provision of high value maternity care in Australia.

Keywords: administrative data, efficiency, maternity care funding, maternity services, performance monitoring, perinatal care, postpartum, pregnancy.

Received: 28 April 2022
Accepted: 11 January 2023
Published: 7 February 2023

Cite this:
Eklom B *et al.* (2023)
Australian Health Review
47(2), 148–158. doi:10.1071/AH22108

Introduction

It is widely recognised that public maternity services in Australia provide safe and high-quality care.[1,2] However, this is a significant cost to the public health system. Care of childbearing women and newborns is one of the leading reasons for accessing public hospital services in Australia and a key driver of public hospital costs.[3] Women in Australia also experience significant out-of-pocket expenditure even when accessing maternity care in public hospitals.[4–6]

A key contributor to the cost of childbirth in public hospitals is Australia's relatively high rates (vs other high income countries) of birth interventions, many of which are not supported by best available evidence.[7–9] For example, the Australian Quality and Safety Commission *Fourth Australian Atlas of Healthcare Variation* identified that in 2017 the rates for caesarean section without a medical or obstetric indication varied across states and territories (excluding the Northern Territory) from 13.3% to 19.3% for births at <37 weeks, 24.8–32.7% for births at <38 weeks and 42.8–56.1% for births at <39 weeks.[10]

Australia's routine performance monitoring of maternity care occurs largely through the National Core Maternity Indicators.[11] However, these are designed to capture the change in the safety and quality of services and do not include cost and efficiency domains or changes in cost over time. Similarly, Independent Hospital Pricing

Table 1. Change in mean cost of health service use for women and their babies in Queensland in the public hospital system (by birth location), private system and in the home in Queensland between 1 July 2012 and 30 June 2018.

Cost by funder (A$)	2012	2013	2014	2015	2016	2017	2018
Private hospital, privately funded birth							
MBS	5445	5536	5637	5670	5759	5962	5949
Out-of-pocket (OOP)	4472	4614	4753	4948	5102	5156	5151
PBS	92	94	105	130	205	229	260
Private health insurers	10 295	11 457	13 564	13 152	12 912	15 111	15 783
Public hospital funders	2594	3210	3119	3939	3762	4046	3919
Total	17 360	19 281	21 436	22 039	21 775	24 313	24 853
Home							
MBS	2289	2724	2559	2904	2759	2831	3416
OOP	1172	1281	1405	1532	1576	1672	2021
PBS	7	151	5	24	27	102	133
Private health insurers	52	85	194	76	416	110	407
Public hospital funders	4880	5744	3748	3852	1945	4275	3677
Total	6104	7110	5347	5460	3937	6056	6105
Cairns and Hinterland							
MBS	2160	2243	2333	2537	2611	2650	2606
OOP	277	317	323	347	339	341	314
PBS	68	61	77	90	123	138	131
Private health insurers	131	139	176	155	159	174	119
Public hospital funders	26 793	29 515	32 645	33 649	34 407	35 199	36 667
Total	27 201	29 970	33 144	34 151	34 905	35 714	37 100
Central Queensland							
MBS	1937	2121	2315	2375	2443	2610	2539
OOP	513	508	496	510	505	519	491
PBS	66	67	56	63	80	93	85
Private health insurers	413	299	353	405	297	356	357
Public hospital funders	23 294	25 255	28 977	29 457	29 778	33 431	34 332
Total	24 221	26 063	29 826	30 372	30 579	34 307	35 180
Central West							
MBS	1679	1926	2267	2334	2163	2560	2227
OOP	723	652	713	804	574	617	502
PBS	47	82	102	96	89	103	100
Private health insurers	399	521	564	1043	184	278	144
Public hospital funders	20 605	28 463	32 297	30 651	41 715	41 152	31 507
Total	21 727	29 636	33 575	32 498	42 473	42 047	32 153
Darling Downs							
MBS	2151	2238	2342	2518	2579	2664	2537
OOP	445	462	508	560	570	630	598
PBS	82	83	90	94	113	167	136
Private health insurers	316	294	335	390	280	446	266
Public hospital funders	22 886	29 324	30 253	30 626	31 268	34 113	35 343
Total	23 647	30 080	31 097	31 576	32 118	35 189	36 207

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Table 1. (*Continued*)

Cost by funder (A$)	2012	2013	2014	2015	2016	2017	2018
Gold Coast							
MBS	2746	2807	2922	2977	2973	3041	3141
OOP	424	467	571	604	597	627	716
PBS	66	87	84	78	78	121	136
Private health insurers	167	143	249	231	208	199	274
Public hospital funders	19 390	23 826	25 646	26 857	26 708	31 108	32 758
Total	19 982	24 436	26 467	27 692	27 513	31 934	33 748
Mackay							
MBS	2069	2137	2176	2297	2493	2419	2411
OOP	582	626	616	592	581	662	696
PBS	75	66	88	111	75	98	102
Private health insurers	325	390	437	399	260	307	303
Public hospital funders	24 196	26 701	29 966	30 324	32 397	35 127	34 478
Total	25 103	27 718	31 018	31 315	33 238	36 096	35 478
Metro North							
MBS	2472	2601	2715	2853	2988	3055	3156
OOP	487	513	529	564	628	630	644
PBS	87	94	100	97	123	139	145
Private health insurers	233	292	330	329	333	393	290
Public hospital funders	25 766	29 789	33 111	34 238	33 702	37 543	37 541
Total	26 486	30 595	33 971	35 131	34 663	38 565	38 474
Metro South							
MBS	2550	2635	2755	2742	2827	2896	2901
OOP	374	361	373	398	441	445	474
PBS	66	71	82	78	89	95	117
Private health insurers	121	97	135	154	167	164	152
Public hospital funders	20 595	24 002	27 232	28 342	29 197	30 059	32 837
Total	21 090	24 460	27 741	28 894	29 805	30 669	33 463
North West							
MBS	1252	1281	1469	1703	1907	2205	2041
OOP	498	433	487	489	542	550	466
PBS	118	97	74	115	108	182	97
Private health insurers	291	206	215	245	441	350	357
Public hospital funders	28 171	31 805	34 327	31 554	37 992	40 234	41 530
Total	28 959	32 444	35 028	32 288	38 975	41 135	42 353
South West							
MBS	1760	1956	1973	2109	2191	2047	2126
OOP	287	320	299	379	424	419	566
PBS	37	34	70	73	86	46	56
Private health insurers	199	392	221	452	305	207	214
Public hospital funders	21 344	27 651	30 199	29 846	34 093	33 498	32 645
Total	21 830	28 363	30 720	30 677	34 822	34 124	33 424

(*Continued on next page*)

Table 1. (*Continued*)

Cost by funder (A$)	2012	2013	2014	2015	2016	2017	2018
Sunshine Coast							
MBS	2539	2602	2747	2848	2782	2955	2949
OOP	389	390	399	447	462	514	524
PBS	77	95	110	114	113	158	431
Private health insurers	108	140	265	127	101	227	302
Public hospital funders	23 006	26 076	29 354	30 758	30 958	33 405	33 949
Total	23 503	26 606	30 018	31 332	31 522	34 146	34 774
Torres and Cape							
MBS	1352	1190	1218	1393	1643	1720	2080
OOP	90	180	109	93	96	132	126
PBS	83	84	66	86	153	123	66
Private health insurers	121	280	148	23	25	28	344
Public hospital funders	24 734	34 627	36 747	34 646	43 554	42 009	36 918
Total	24 945	35 087	37 005	34 762	43 675	42 169	37 387
Townsville							
MBS	2330	2348	2595	2730	2832	2830	2903
OOP	424	423	449	457	470	485	539
PBS	74	68	84	96	173	152	120
Private health insurers	262	269	298	285	316	297	411
Public hospital funders	26 588	28 900	32 829	32 877	35 857	39 268	38 982
Total	27 274	29 592	33 576	33 619	36 643	40 050	39 932
West Moreton							
MBS	2539	2708	2785	2702	2793	2846	2880
OOP	251	292	303	304	357	348	335
PBS	85	81	98	100	134	136	154
Private health insurers	92	125	128	86	171	182	82
Public hospital funders	20 170	23 873	26 443	26 019	29 596	30 141	31 242
Total	20 513	24 290	26 874	26 410	30 123	30 671	31 659
Wide Bay							
MBS	2452	2540	2734	2844	2997	2951	2832
OOP	580	593	621	596	663	742	680
PBS	116	140	101	106	117	137	124
Private health insurers	309	362	334	302	316	392	301
Public hospital funders	23 229	25 435	26 848	29 911	30 967	30 580	32 493
Total	24 118	26 390	27 802	30 809	31 945	31 714	33 473

Authority (IHPA) costing exercises focus largely on the cost of maternity care at the activity level and do not encompass safety and quality domains across the whole journey of maternity care.

There is significant pressure on public hospital systems to constrain rises in the cost of public hospital care, including maternity care, due to caps on Commonwealth funding of public hospitals outlined in the National Health Reform Agreement.[12] This is likely to be exacerbated by an anticipated increase in health service usage arising from delayed healthcare access for a range of conditions due to the impacts of coronavirus diseas 2019 restrictions.[13–17] There is a clear need for routine performance monitoring that includes safety, quality and cost-efficiency domains if public hospitals are to continue to deliver high-quality care in a constrained fiscal environment.

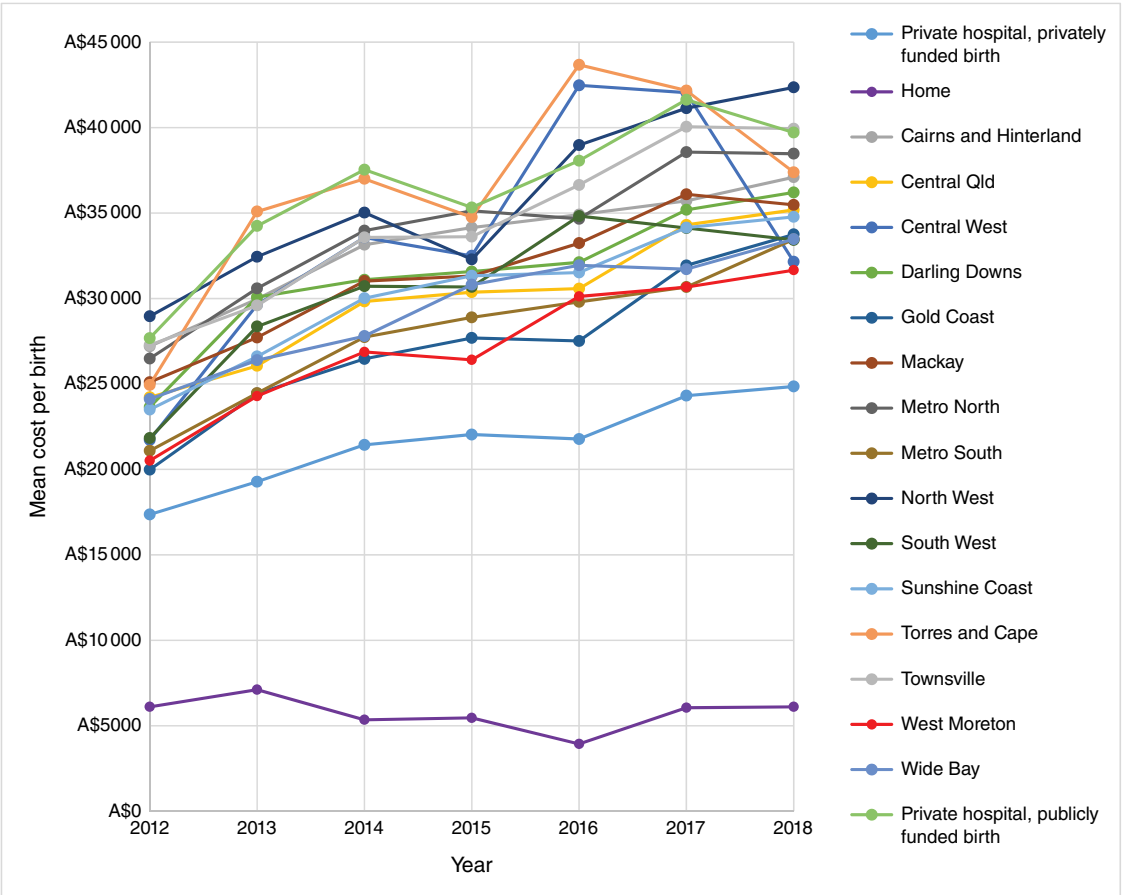

Fig. 1. Change in mean total costs of health service use for women and their babies in the public hospital system (by birth location), private system and in the home in Queensland between 1 July 2012 and 30 June 2018.

The aim of this study was to describe the change in costs to different funders over time for women giving birth in Queensland between 2012 and 2018.

Methods

This study utilised the Maternity1000 dataset,[18] a whole-of-population linked administrative dataset. All women who gave birth in Queensland between 1 July 2012 and 30 June 2018 were identified using the Queensland Perinatal Data Collection and their records linked to the Admitted Patient Data Collection; Non-admitted Patient Data Collection; Emergency Department Collection; Medicare Benefits Schedule (MBS); and Pharmaceutical Benefits Scheme (PBS) claims records from the onset of pregnancy to 12 months after the birth.

Costs to public hospital funders, including costs for publicly funded births that occur in a private hospital, were identified from the AR-DRG (Australian Refined Diagnosis Related Groups), URG (Urgency Related Groups) and Tier 2 clinic codes associated with inpatient, emergency department and outpatient services use, respectively, and the corresponding cost identified from the National Efficient Price reports released by the IHPA. Costs to private health insurers for private hospital inpatient events were identified from Private Hospital Reporting Bureau Annual Reports based on reported AR-DRG codes; and costs for health services provided in each inpatient event were identified from MBS claims records as the difference between the provider charge and the Medicare subsidy. Costs to Medicare and the PBS were identified directly from MBS and PBS claims records, respectively. Costs to individual women were identified from MBS and PBS claims records. All costs were adjusted to 2019–20 Australian dollars based on the Consumer Price Index.

Analysis

The mean cost of care from onset of pregnancy to 12 months after the birth for mothers and babies was identified by year (2012–18) and by the Hospital and Health Service (HHS) hospital that the mother birthed in. All costs were attributed back to the HHS of birth, given that care and events at the time of birth potentially have long-term effects on health outcomes, and thus health costs. HHSs

were also grouped by the Clinical Services Capability Framework (CSCF) level of their maternity services. Costs during this time period were also presented by funder: public hospital funders (including those births that may have occurred in a private hospital but were publicly funded); Medicare; PBS; private health insurers; and individuals through out-of-pocket fees.

This study does not control for variations in clinical and demographic factors, given that the aim of this study is to capture the variation in total costs over time. If clinical and demographic factors mean that more resources are required to deliver maternity care in a given HHS (or private or home birth) then it is valid that this is captured in a total cost analysis.

Identification of outcomes

The study team used a composite birth outcome measure, based upon that reported in a previous study,[19] which maps the variables collected in routine data to values and principles outlined in the *Australian woman-centred care: Strategic directions for Australian maternity services* document.[20]

A positive birth outcome was defined as any birth that had an absence of:

- Stillbirth
- Neonatal death (death within 30 days of birth)
- Infant admission to special care or neonatal intensive care
- Infant APGAR score <7 at 5 min
- Hypoxic–ischaemic encephalopathy
- Infant birth trauma (i.e. brachial plexus injury, fractured clavicle or humerus)
- Intrauterine hypoxia
- Other perinatal morbidity (i.e. meconium aspiration syndrome, congenital pneumonia or respiratory distress syndrome)
- A third or fourth degree tear
- Postpartum haemorrhage in the woman
- Retained placenta
- Rupture of uterus
- Intrapartum haemorrhage in the woman.

The number of births defined as a positive birth outcome were then identified by year and HHS.

Table 2. Number and percentage of births meeting the requirements of the composite outcome measure in the public hospital system (by birth location), private system and in the home in Queensland between 1 July 2012 and 30 June 2018.

HHS	Number and percentage of births meeting composite measurement requirements, by year						
	2012[A]	2013	2014	2015	2016	2017	2018[A]
Private hospital, privately funded birth	7328, 80%	14 549, 80%	13 869, 80%	13 193, 80%	12 681, 79%	11 753, 79%	5597, 80%
Private hospital, publicly funded birth	1951, 75%	3948, 75%	3852, 73%	4485, 76%	4086, 72%	3997, 71%	2122, 73%
Home	33, 87%	78, 89%	72, 89%	81, 85%	121, 92%	120, 94%	46, 94%
Cairns	1001, 64%	2156, 66%	2341, 71%	2143, 71%	1948, 64%	1615, 57%	708, 49%
Central Qld	896, 74%	1817, 72%	1758, 73%	1677, 71%	1634, 72%	1503, 71%	753, 68%
Central West	53, 90%	85, 90%	82, 83%	73, 75%	66, 79%	51, 86%	25, 83%
Darling Downs	1136, 75%	2369, 73%	2289, 73%	2270, 72%	2226, 72%	2144, 72%	1053, 70%
Gold Coast	1285, 70%	2588, 67%	3269, 70%	3124, 67%	3402, 69%	3345, 66%	1658, 66%
Mackay	613, 67%	1248, 67%	1196, 67%	1180, 63%	1238, 65%	1030, 60%	559, 59%
Metro North	2439, 59%	4865, 62%	4814, 60%	4753, 61%	5031, 59%	4677, 58%	2453, 59%
Metro South	2029, 74%	4268, 77%	4104, 76%	3773, 74%	3959, 75%	3951, 76%	2221, 78%
North West	152, 63%	381, 72%	348, 69%	308, 64%	280, 65%	241, 60%	123, 60%
South West	127, 92%	273, 90%	255, 89%	237, 89%	208, 88%	211, 87%	83, 81%
Sunshine Coast	920, 66%	1987, 69%	1969, 67%	2029, 68%	2010, 65%	2305, 71%	1202, 70%
Torres and Cape	55, 87%	97, 76%	106, 75%	131, 89%	122, 78%	104, 77%	52, 83%
Townsville	900, 69%	1772, 67%	1819, 66%	1821, 68%	1730, 66%	1542, 61%	698, 53%
West Moreton	1137, 76%	2047, 72%	1954, 70%	1884, 73%	1766, 69%	1582, 66%	852, 64%
Wide Bay	753, 71%	1580, 73%	1486, 73%	1368, 67%	1281, 71%	1223, 69%	637, 71%

[A]Reflects the number of births meeting composite measure requirements for the period 1 January–30 June, i.e. 6 months of birth data only.

All analyses were carried out using SAS 9.4 (SAS Institute, Cary, NC, USA).

Ethics approval

Ethics approval was obtained from the Townsville Hospital and Health Service Human Research Ethics Committee (HREC; HREC/16/QTHS/223) and the Australian Institute of Health and Welfare (EO2017-1-338). In addition, we obtained Public Health Act approval (RD007377) for the study.

Results

Table 1 and Fig. 1 show the change in mean cost of health service use for women and their babies in Queensland by funding type and place of birth. Note that funding type includes both births in private hospitals that are privately funded and births in private hospitals that are publicly funded. Table 2 shows the change in the number of births meeting the requirements of the composite outcome measure over time. Across all HHSs, hospital and MBS costs are the major components of total cost. Public hospitals and private births (including private hospital, privately funded births and private hospital, publicly funded births) have experienced an increase in mean total cost from 2012 to 2018, while the cost of home births was static. North West HHS has the highest mean total cost in 2018 (A$42 353), while home births had the lowest total costs (A$6105) in 2018. From 2012 to 2018 private hospital, privately funded births and home births had the lowest mean total costs.

Fig. 2 shows the change in mean total out-of-pocket cost for women and their babies by place of birth. Mean out-of-pocket cost is highest for private and home births. There has been little increase in the mean total out-of-pocket cost for women giving birth in the public sector, with women giving birth in the Torres and Cape HHS having the lowest mean total out-of-pockets costs.

Fig. 3 shows the percentage change in mean total cost for women by place of birth, grouped by clinical services capabilities and specialisation. In Queensland, the CSCF for public and licensed private health facilities is a suite of documents that describes clinical and support services by service capability level, with the complexity and availability of services increasing from Level 1 (no planned births) to

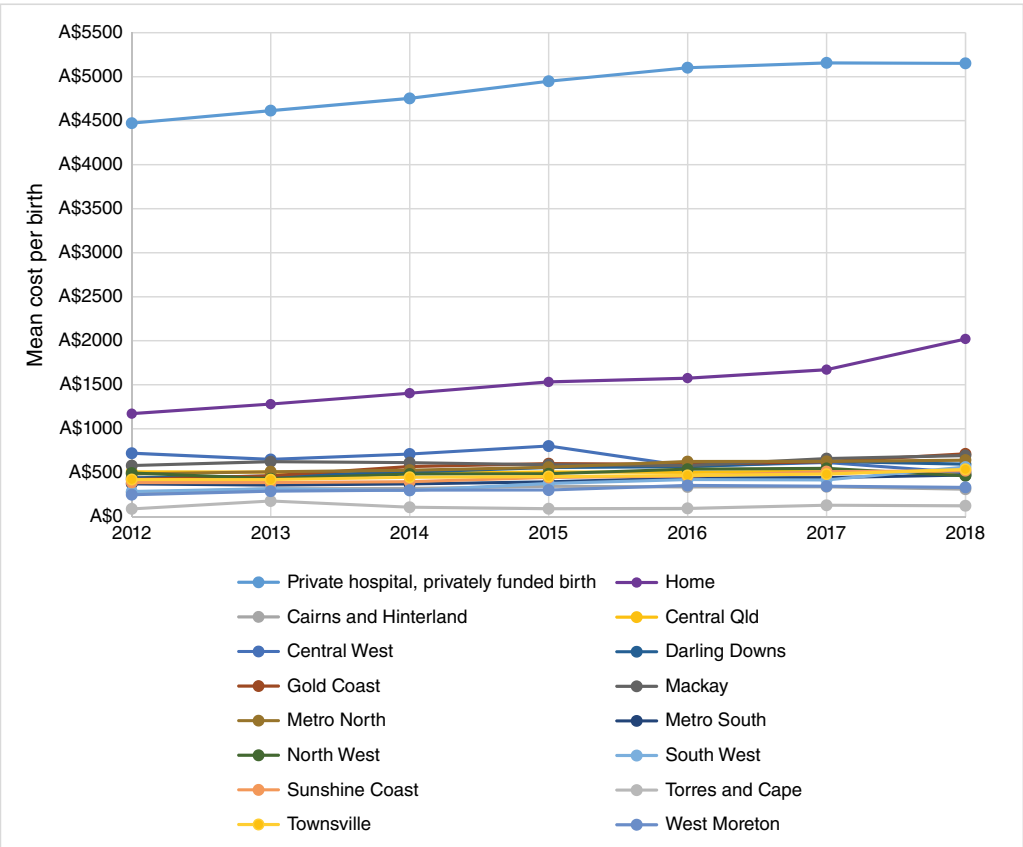

Fig. 2. Change in mean total out-of-pocket costs for women and their babies in the public hospital system (by birth location), private system and in the home in Queensland between 1 July 2012 and 30 June 2018.

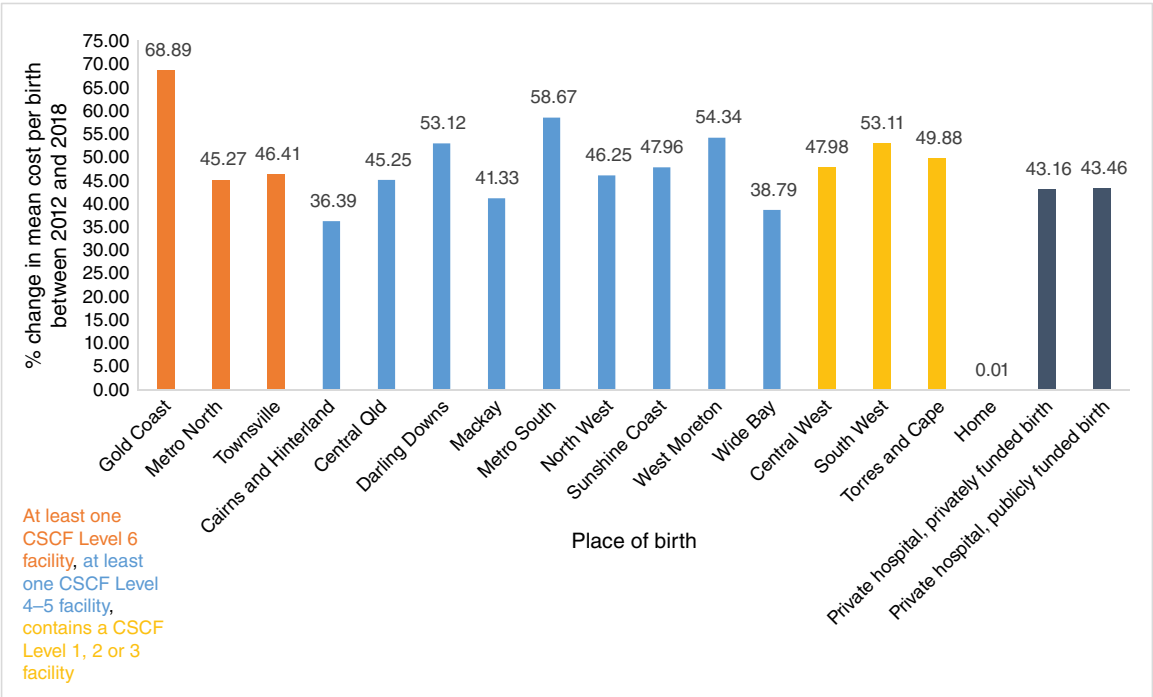

Fig. 3. Percent change in mean total costs of health service use for women and their babies in the public hospital system (by birth location), private system and in the home from 1 July 2012 to 30 June 2018 grouped by clinical services capabilities and specialisation.

Level 6 (complex births).[21] Level 6 facilities are typically located in major metropolitan or inner regional centres, Level 4–5 facilities in large rural or outer regional centres and Level 1–3 facilities in small rural, remote and very remote facilities.[22]

Fig. 3 indicates that across all CSCF groupings there has been a substantial increase in mean total cost from 2012 to 2018, in the range of 36–69%. HHSs containing a Level 1, 2 or 3 facility (Central West, South West and Torres Cape) have experienced higher percentage increases in costs than most of the HHSs with a Level 4 or 5 facility or Level 6 facility. Gold Coast HHS was the HHS that experienced the biggest percentage change in mean total costs from 2012 to 2018 (68.89%), followed by Metro South (58.67%) and West Moreton (54.34%) and Darling Downs (53.12%) HHSs. Private births have experienced a moderate percentage increase in cost from 2012 to 2018 (43.16%) while home births have experienced a negligible percentage increase in costs of 0.01%.

Fig. 4 shows the change in percentage of births that can be defined as a positive birth outcome by birth setting and by CSCF grouping. A comparison of Table 1, Figs 1, 3, 4 shows that although the mean cost of birth has increased in public hospitals and private hospitals, the percentage of positive birth outcomes has not seen a similar rise: positive birth outcomes have remained largely static or have declined across all HHS. As shown in Table 1, Fig. 3, mean total costs per birth for Cairns and Hinterland HHS rose 36.39% between 2012 and 2018, from A$27 201 to A$37 099.60, while the percentage of positive birth outcomes declined from 64% in 2012 to 49% in 2018. Similarly, the mean total cost per birth for Townsville HHS rose 46.41% from A$27 273 in 2012 to A$39 932 in 2018, while the percentage of positive birth outcomes declined from 69% in 2012 to 53% in 2018. West Moreton and South West HHSs also experienced a decline in positive birth outcomes in excess of 10% between 2012 and 2018 (West Moreton 76–64%; South West 92–81%) while mean cost increased in excess of 50% (West Moreton 54.35%, South West 53.11%). Metro South and Sunshine Coast were the only HHSs for which the percentage of positive birth outcomes increased between 2012 and 2018 (from 66% to 70% for Sunshine Coast and from 74% to 78% for Metro South). All other HHSs experienced a decline in positive birth outcomes between 2012 and 2018 of 0–10%, irrespective of CSCF level, while mean total cost per birth rose between 38% and 68%. HHSs with at least one CSCF Level 1–3 facility have a higher percentage of positive birth outcomes across 2012–2018 (in the range of 75–92%) than HHSs with a Level 6 (53–69%) or at least one Level 4–5 facility (49–78%). Only home births have seen an increase in the percentage of positive birth outcomes (87% in 2012 to 94% in 2018) as the mean cost of home births has remained constant (A$6104 in 2012 and 2018).

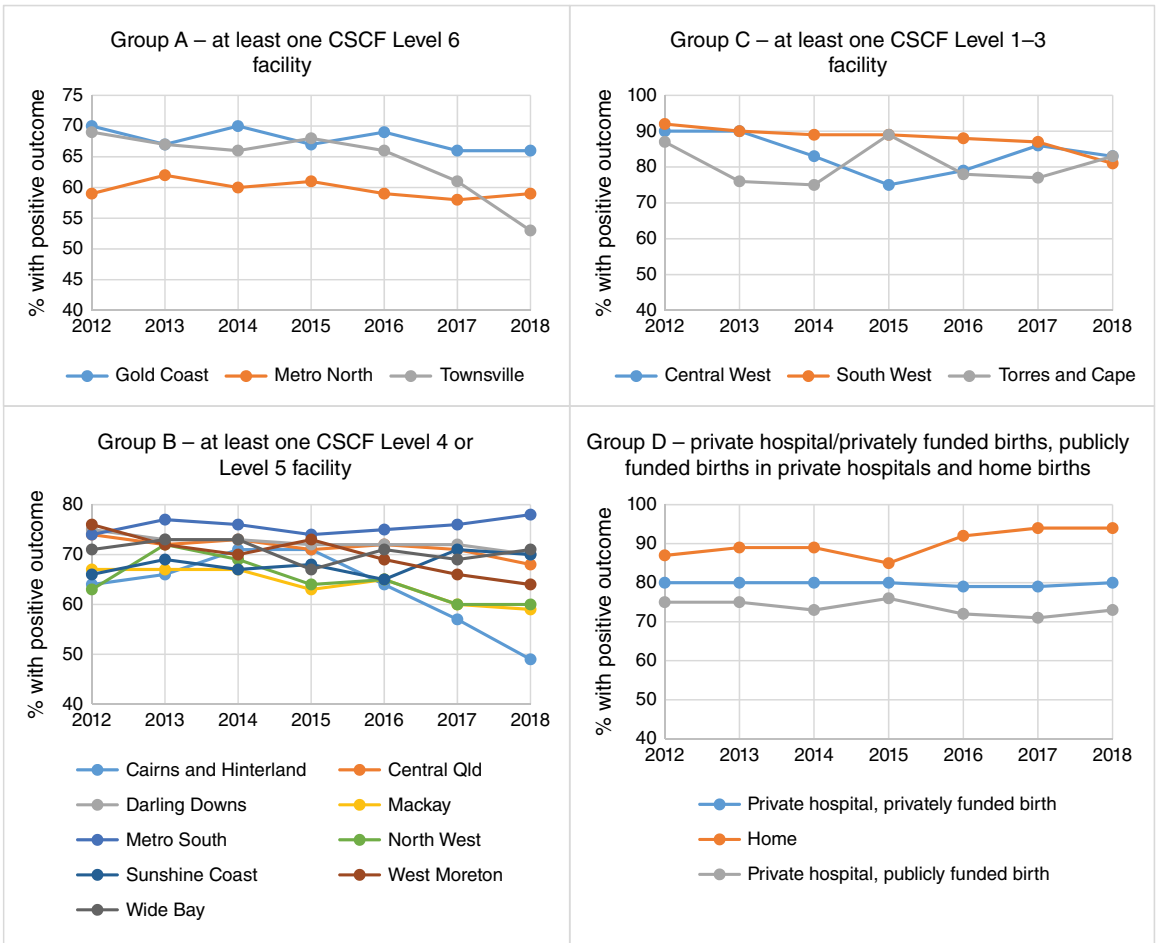

Fig. 4. Change in percentage of births with a positive birth outcome for women and their babies in the public hospital system (by birth location), private system and in the home in Queensland between 1 July 2012 and 30 June 2018.

Discussion

The aim of this study was to identify the total costs associated with care delivered in the public system, private system or in the home to women and their babies from pregnancy to 12 months in Queensland, from 1 July 2012 to 1 July 2018. Costs are investigated from the perspective of the funder of this care and to highlight the change in actual cost of maternity care delivery to funders (whether this is the public health system, private health system or the patient). Funders of health care, including the public health system, largely cannot influence the clinical and demographic factors of the patients they treat. As such, clinical and demographic factors have not been controlled for when assessing the cost of maternity care delivery by funder/HHS, given that adjusting for clinical and demographic factors would in fact not be an accurate representation of the actual cost to funders of delivering care. We identified that there is considerable variation in costs dependent upon place of birth and that the cost of maternity care has increased over time. This study also demonstrated that these variations and increases in cost do not appear to be correlated with geography or clinical services capabilities and specialisations. All HHSs experienced an increase in total costs from 2012 to 2018, and when grouped by clinical services capabilities and specialisations there was no evidence of a different pattern of cost increases between the CSCF groupings. As outlined above, this study did not adjust for clinical and demographic factors, therefore it is possible that these increases in costs may be attributable to changes in clinical and demographic factors in women who gave birth during the study period of 2012–18.

This study also considered the value of maternity care provided in HHSs, private and home birth settings by use of a composite outcome measure. This composite measure defines positive birth outcomes that should be achievable for all women and that correlate with the four values of safety, respect, choice and access outlined in Australia's national maternity strategy.[19] Calculating the percentage of positive birth outcomes for all women by place of birth and comparing this with the mean cost of birth provides a measure of the value of maternity care provided in each setting and takes into account variations in clinical and demographic factors.

When women may require additional resources to achieve a positive birth outcome (e.g. a caesarean section) no penalty is applied to the given maternity service because costs are attributed to a positive birth outcome, that is, the maternity service is providing high value care.[23] However, if a maternity service is consuming a high level of resources and not achieving a positive birth outcome, then the maternity service may be providing low value care.[23]

Between 2012 and 2018, Townsville HHS, Cairns and Hinterland HHS, and the West Moreton and the South West HHSs had a substantial decrease (>10%) in the percentage of positive birth outcomes, despite experiencing a rise in mean total cost per birth (<35%). Home births, Metro South and Sunshine Coast HHSs were the only birth settings for whiche the percentage of positive birth outcomes increased between 2012 and 2018 (from 66% to 70% for Sunshine Coast, 74–78% for Metro South and from 87% to 94% for home births).

All other HHSs had a decline in the percentage of positive birth outcomes to a greater or less extent, while the mean total cost of birth has increased (e.g. for Central Queensland the percentage of positive birth outcomes declined from 74% to 68% between 2012 and 2018 while the mean total cost of birth increased by 45.25%). This may indicate that these HHSs have had to consume greater resources to deliver positive birth outcomes, perhaps associated with changing clinical or demographic factors associated with their catchment population. The notable exception to this trend is home births, for which the costs have remained stable and outcomes improved. When placed in the context of Australia's relatively high rates (vs other high income countries) of birth interventions, many of which are not supported by best available evidence and do not result in better health outcomes,[7–9] this decline in the percentage of positive birth outcomes may be indicative of less than optimal resource use.

Conclusion

This study has shown an increase over time across Queensland in the costs associated with health care delivered in public hospitals, in the private system and in the home for women and their babies from onset of pregnancy to 12 months after the birth. This increase in costs is associated with a decrease in the percentage of births with a positive outcome (as defined by a composite outcome measure). Further effort should be made to identify the variables associated with low value care and to identify cost-effective, high value models of care that can deliver positive birth outcomes.

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Data availability. The data that support this study were obtained from the Australian Institute of Health and Welfare and Queensland Health by permission/licence. Data will be shared upon reasonable request to the corresponding author with permission from the Australian Institute of Health and Welfare and Queensland Health.

Conflicts of interest. The authors declare that they have no conflicts of interest.

Declaration of funding. This research did not receive any specific funding.

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