

Trends in antimalarial medicine and malaria diagnostic availability in Cambodia between 2009 and 2013

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BACKGROUND

- Treatment failure using the artemisinin combination therapies (ACT) artemether lumefantrine (AL), artesunate mefloquine (ASMQ) and dihydroartemisinin piperazine (DHA-PPQ) has been detected in more than 10% of cases in Cambodia.¹ Factors believed to have contributed to emerging drug resistance in Cambodia include the unregulated sale of artemisinin monotherapies for over 40 years; limited access to ACTs; co-blistered ACTs that are not co-formulated (facilitating continued use of artemisinin monotherapy); and ubiquitous counterfeit and sub-standard drugs. Current regulatory efforts and malaria policy are aimed at protecting artemisinin-based combination therapy (ACT) treatment efficacy.
- To protect the efficacy of artemisinin, the sale of oral artemisinin monotherapy (oAMT) was banned in Cambodia in 2009 and strategies were deployed to enforce this ban through stronger regulation of private sector outlets.
- To ensure parasite clearance in the context of evolving drug resistance, the first-line treatment for *P. falciparum* (Pf) in Cambodia changed from ASMQ to ASMQ or DHA-PPQ in 2012 following targeted use of DHA-PPQ since 2009 in artemisinin resistance containment areas.
- The 2012 national malaria treatment guidelines state that all suspected malaria cases should receive confirmatory testing prior to treatment.
- Multiple strategies have been implemented to ensure the scale up of malaria blood testing and first-line treatment. These include a Village Malaria Worker (VMW) program supported within the public sector, and a social marketing approach in the private sector. Recent ACT and RDT subsidies available to the public and private sectors have been funded through the Global Fund including delivery of co-paid DHA-PPQ to first-line buyers in 2012 and 2013.

RESULTS

- Outlets distributing antimalarials in Cambodia:** Outlets stocking antimalarials in Cambodia include public health facilities and village malaria workers (VMW), regulated private sector outlets including private for-profit facilities and pharmacies, and unregulated private sector outlets including drug shops, general retail outlets, and itinerant drug vendors. Antimalarial availability declined over time among private sector outlets, and by 2013 was particularly low among unregulated private sector outlet types (drug shops, 21%; general retail <1%, itinerant drug vendor, 18%) (Fig 1). Private sector market composition shifted over time towards increasing relative contribution from regulated private sector outlet types, and declining contribution from unregulated private outlet types (Fig 2).
- Antimalarials in stock (among antimalarial-stocking outlets):** The percentage of private sector outlets stocking oral artemisinin monotherapy decreased over time and in 2013 was limited to <1% among private for-profit health facilities and 5% among itinerant drug vendors (Fig 3). Following the change in first-line treatment to DHA-PPQ in 2012, ASMQ availability decreased over time and DHA-PPQ availability increased such that by 2013, most antimalarial-stocking public health facilities (85%) and VMWs (95%) had this first-line ACT in stock. Among private sector outlets, availability of DHA-PPQ also increased following policy change and by 2013, most private health facilities (65%) and pharmacies (72%) had DHA-PPQ in stock. DHA-PPQ availability was lower among drug stores (42%), general retailers (14%) and itinerant drug vendors (47%) (Fig 3). Chloroquine availability decreased over time and was low among public and private sector outlets in 2013 with the exception of drug stores (44%) and general retailers (69%) (Fig 3).
- Antimalarials distributed – market share:** At the national level, the private sector has maintained an antimalarial market share that is larger than the public sector, although the margin was decreasing by 2013 with 40% market share for the public sector and 60% for the private sector. Oral artemisinin monotherapy accounted for 6% of the total antimalarial market share in 2009 and 1% in 2011, but was reportedly no longer sold/distributed in 2013. Nearly 90% of antimalarials distributed at the time of the 2013 survey were either DHA-PPQ (63% of the national market share) or ASMQ (23%). 2013 chloroquine market share was 12% (Fig 4).
- Availability of malaria blood testing:** Malaria blood testing availability (RDT or microscopy) remained high over time among public and private health facilities and CHWs. Availability has remained relatively lower among other private sector outlets. Nonetheless in 2013, half of antimalarial-stocking drug shops and 61% of pharmacies had malaria blood testing available (Fig 5).

METHODS

- Antimalarial medicine outlet surveys were conducted as part of the ACTwatch project in Cambodia in 2009 (June - July), 2011 (June - August) and 2013 (September - October). A census of all outlets with the potential to sell/distribute antimalarials was conducted within a nationally representative sample of clusters (communes) with stratification by the national malaria control program zones (see Table 1).
- Drug information, sale/distribution in the previous week, and retail price were collected for each antimalarial in stock. Product and distribution information was used to calculate relative market share using the adult equivalent treatment dose as the unit of analysis.

Table 1. Sample Summary

Number of Outlets:	2009	2011	2013
Approached	7,833	18,584	16,153
Screened	7,513	17,923	15,755
Eligible: Antimalarial(s) in stock	865	1,283	1,221
Eligible: Antimalarial(s) out of stock but reportedly in stock within 3 months	7	246	123
Eligible: Antimalarial(s) not in stock but blood testing available	n/a	n/a	112
Interviewed: Antimalarial(s) in stock	863	1,270	1,215
Interviewed: Antimalarial(s) out of stock but reportedly in stock within 3 months	7	246	123
Interviewed: Antimalarial(s) not in stock but blood testing available	n/a	n/a	111

Fig 1. Percentage of all outlets with at least one antimalarial in stock on the day of the survey

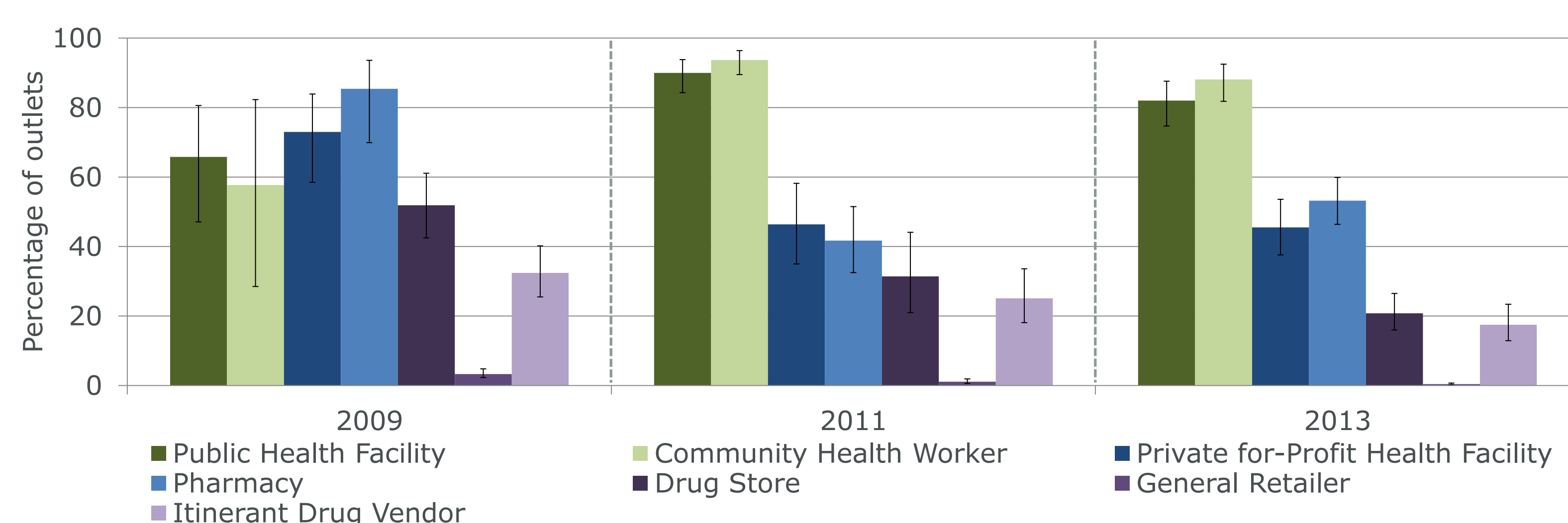


Fig 2. Market composition: outlet type distribution among outlets with at least one antimalarial in stock

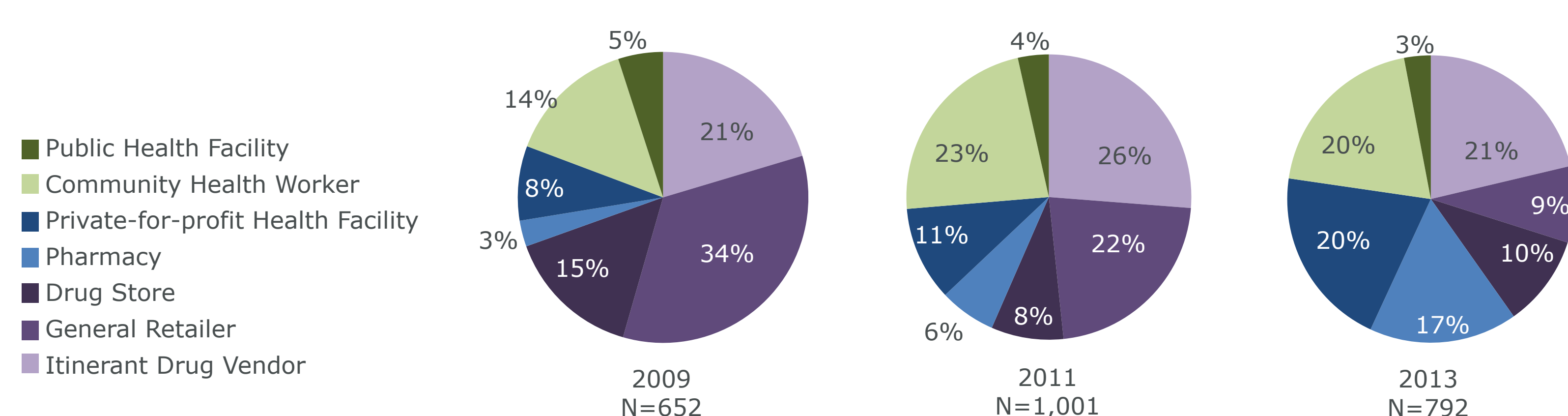


Fig 3. Percentage of antimalarial-stocking outlets with ASMQ, DHA-PPQ, oral artemisinin monotherapy and chloroquine in stock on the day of the survey

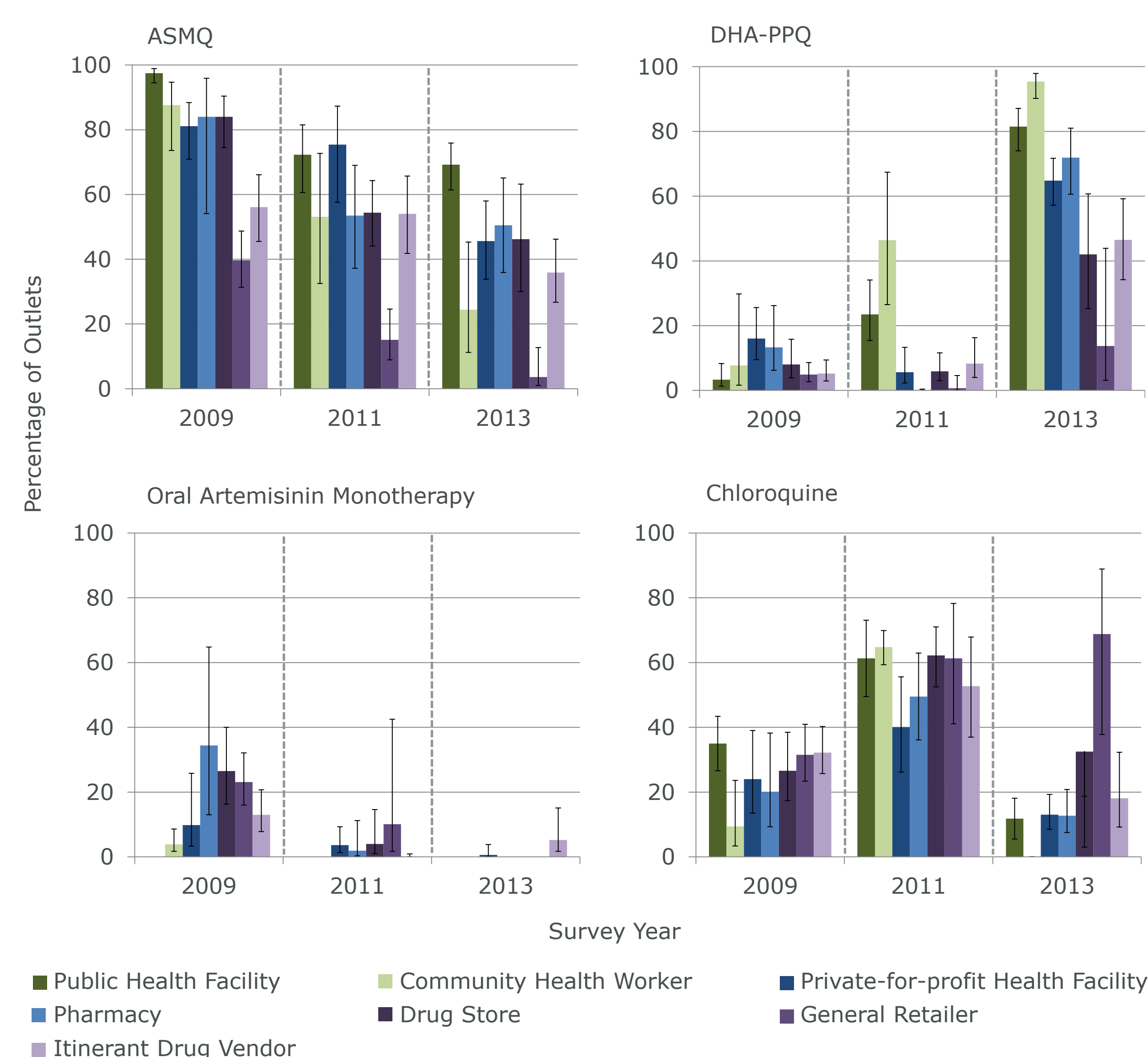


Fig 4. Antimalarial market share

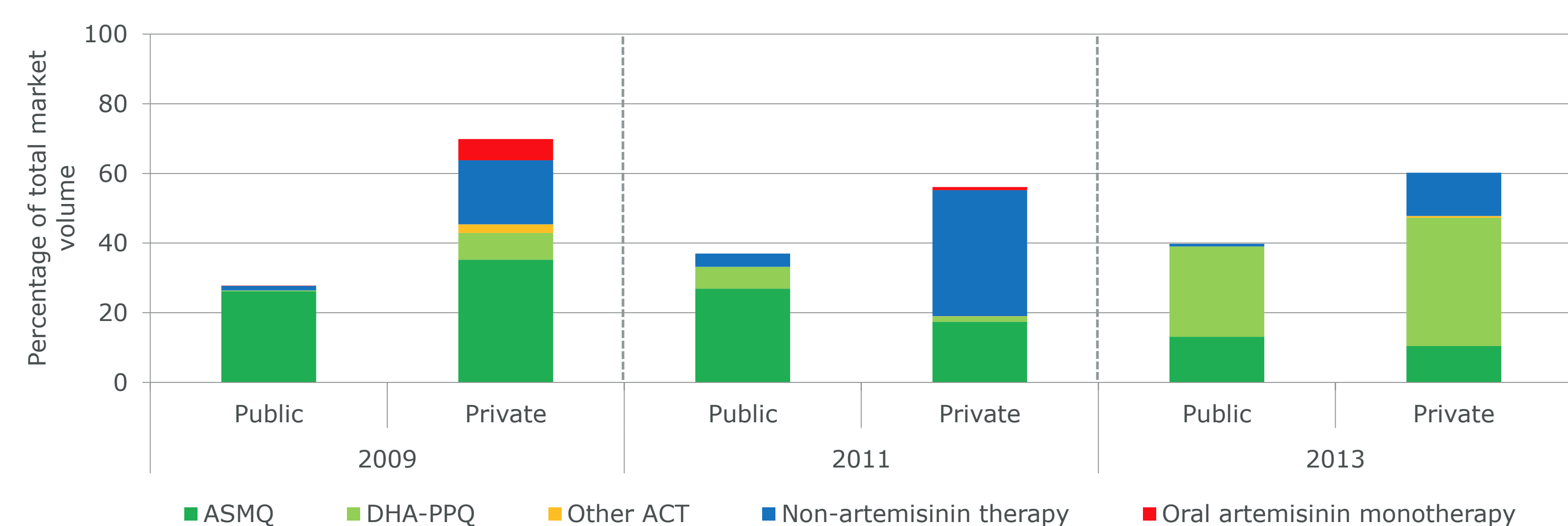
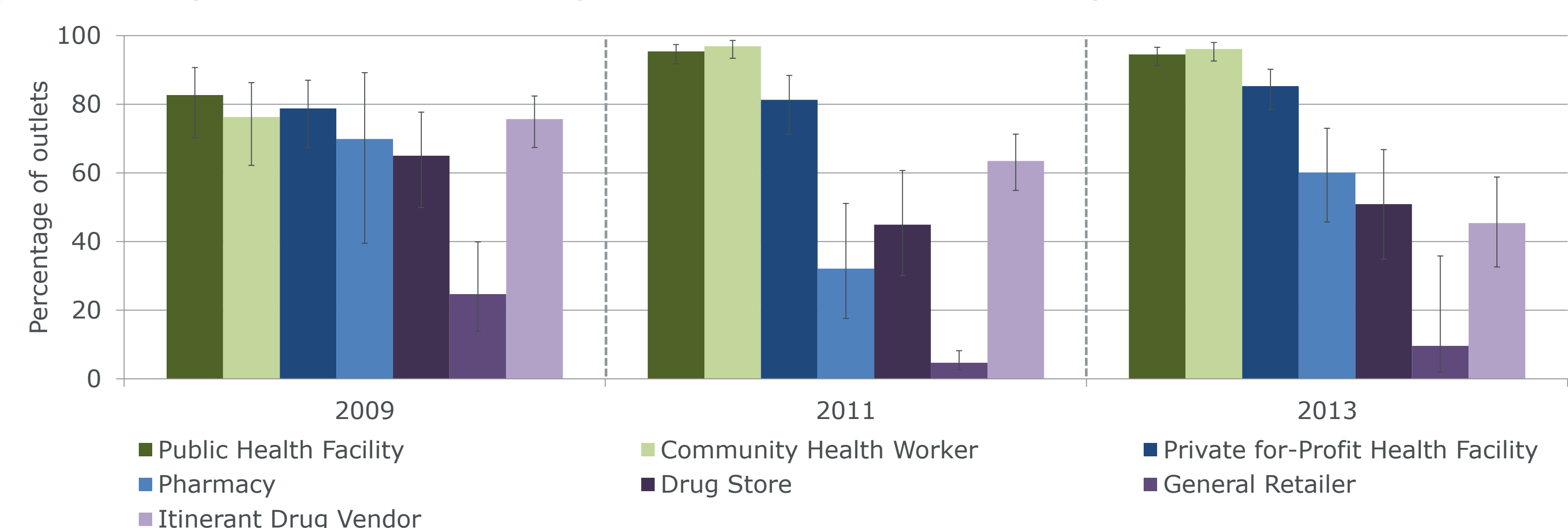


Fig 5. Percentage of antimalarial-stocking outlets with malaria blood testing available



DISCUSSION

Multiple drug policy changes and effective enforcement strategies have been required in Cambodia to respond to the threat of artemisinin drug resistance and to drive progress towards Pf elimination. These drug policy changes have been implemented by public and private sector partners with success, including the removal of oAMT and changes in first-line therapy. The vast majority of antimalarials distributed in Cambodia through public and private outlets are first-line ACT treatments. Adherence to case management policy stipulating confirmatory testing prior to treatment is currently facilitated by high availability of malaria blood testing among public and private health facilities and VMWs and moderate availability among pharmacies and drug shops. Continued implementation of successful public and private sector strategies in support of evolving drug policy will be important for protecting the efficacy of antimalarial medicines and ultimately facilitating Pf elimination in Cambodia and throughout the Greater Mekong Sub-Region.

¹WHO. (2014). Status report on artemisinin resistance, January 2014. Available: http://www.who.int/malaria/publications/atoz/status_rep_artemisinin_resistance_jan2014.pdf?ua=1.

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