PRICE COMPONENTS OF **BLOOD GLUCOSE METERS** AND **TEST STRIPS**

Case studies in China, Peru and Uganda

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Addressing the Challenge and Constraints of Insulin Sources and Supply

HAI HEALTH ACTION INTERNATIONAL

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INTRODUCTION

Access to self-monitoring blood glucose devices (meters, test strips and continuous glucose monitoring devices (CGMs)) is crucial for the management of diabetes. This was recognised in the World Health Organization (WHO) target of '100% of people with type 1 diabetes have access to affordable insulin and blood glucose self-monitoring'[1], and their inclusion in the 2023 list of essential diagnostics.[2]

In low- and middle-income countries (LMICs), retail (patient) prices for self-monitoring blood glucose devices can be exorbitant.[3,4] In these countries, meters and strips are more commonly used than higher priced CGMs.

In 2023/4, data was collected on mark-ups and other costs (price components) in the private sector supply chain for blood glucose meters and test strips in three countries. The aim was to better understand the impact of supply chain costs on patient prices for blood glucose meters and strips. Such evidence helps inform the development of interventions to improve the affordability of self-testing for people paying for meters and strips out-of-pocket.

METHODS

An adapted WHO/Health Action International methodology[5] was used to collect data tracking back from private pharmacies in the capital and a district in Hubei Province, China (Wuhan and Yichang) and Peru (Lima Metropolitana and Cañete), and two districts in Uganda (Wakiso and Jinja). Data was collected on the most supplied brands of blood glucose meters and strips in the private sector.[6,7] The public sector was excluded from the present research because the devices were either free-of-charge or not supplied for self-testing in public sector outlets in these three countries.

Data collection involved (1) literature reviews and key informant interviews on national policies, price components and pricing of these devices; and (2) tracking back in the supply chain for each brand of meter, pack of test strips and combination pack (where marketed), to identify buying and selling prices for the retailer, then relevant wholesaler, and continued to importer or local manufacturer.

The results of the tracking are presented by supply chain stage and show mark-ups by stage, total cumulative mark-ups and their contribution to the retail price. Prices in local currency were converted to US dollars.[8]

Table 1. Price component stages (WHO/HAI methodology[3])

Stage	Description	Examples of price components
1	MSP or CIF price	Manufacturers selling price (MSP), cost, insurance and freight (CIF), freight & insurance
2	Landed cost	Port clearance, import tariff, importer mark-up
3	Wholesale	Overhead costs, storage costs, mark-up, taxes
4	Retail	Overhead costs, mark-up, taxes
5	Dispensed cost	Value-added tax, dispensing fee

FINDINGS

Blood glucose meters

Cumulative mark-ups

Across the countries and brands, the cumulative mark-ups of meters were all over 100%. They ranged from 139% to 263% (Table 2).

Despite One Touch and Nipro having the largest cumulative mark-ups in Hubei and Peru respectively, their final prices were lower than Accu-Chek. This was due to their lower base (MSP/CIF) price. A mixed picture was seen in Uganda.

Mark-ups by stage

The mark-ups by stage were highly variable between Hubei and Uganda. For stage 1, in Peru and Uganda insurance and freight costs were added to the manufacturers selling price (rather than included as was found in Hubei). In Uganda, insurance and freight charges added 15% to the cost, except for one brand where a further charge was included, i.e., 20% to the African regional distributor. Landed costs (stage 2) were 43%-55% in Uganda but 0.1%-17% in Hubei. Wholesale mark-ups (stage 3) were 30% for four of the five brands in Uganda but up to 47% in Hubei. Retail mark-ups (stage 4) were 30%-50% in Uganda but far higher in Hubei at 85%-135%. The only country that had a stage 5 cost was Peru as VAT is applied to meters.

Table 2. Mark-ups for meters

	Hubei, China[9]		Peru[10]		Uganda				
Brand	Accu-Chek	One Touch	Accu-Chek	Nipro	Contour	On Call	Code Free	Sinocare	Gluco Plus
Import/Local	Import	Import	Import	Import	Import	Import	Import	Import	Import
Region	District	District	Capital	District	District	District	District	District	District
Stage 1 MSP USD	-	-	14.2	9.7	5.3	5.3	5.9	4.7	7.9
Stage 1 Ins & freight	-	-	13%	1%	30%	15%	15%	15%	15%
Stage 1 CIF USD	31	17.4	-	-	-	-	-	-	-
Stage 2 Landed	0.10%	17%	unknown		43%	43%	55%	55%	43%
Stage 3 Wholesale	47%	14%			30%	30%	30%	30%	20%
Stage 4 Retail	85%	135%			50%	50%	40%	50%	30%
Stage 5 VAT	0%	0%	18%	18%	0%	0%	0%	0%	0%
Cumulative total	173%	214%	139%	256%	263%	221%	225%	248%	157%
Final price USD	84.4	54.6	38.4	35.1	19.2	16.9	19.3	16.5	20.3

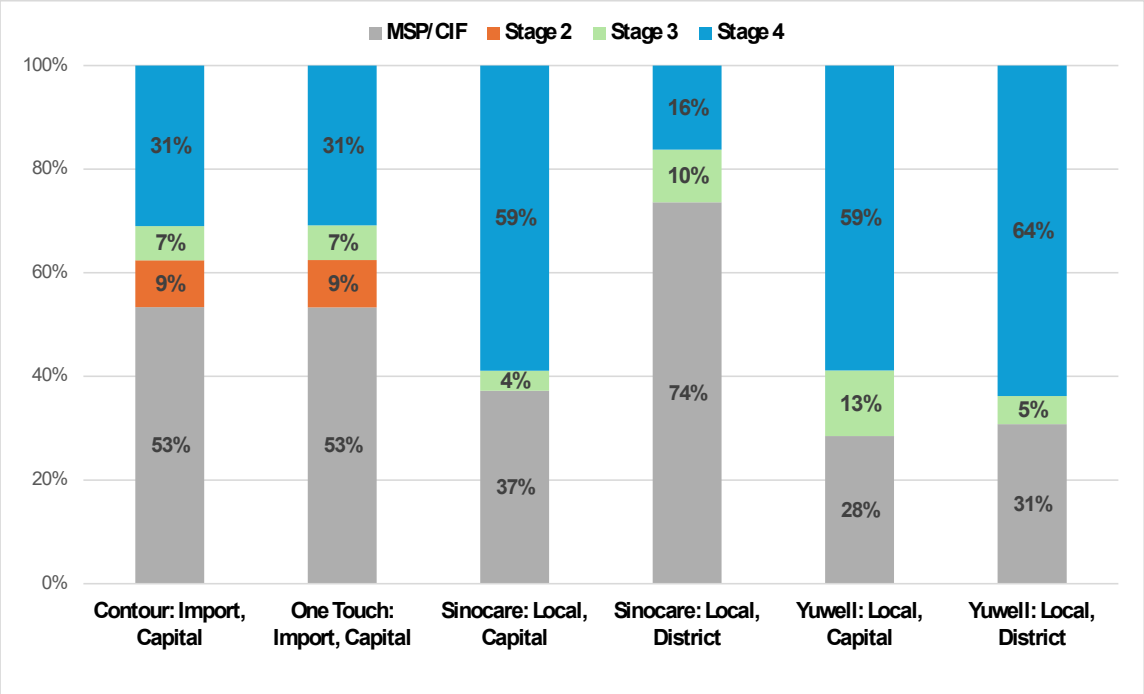
MSP, manufacturers selling price; Ins, insurance; CIF, cost insurance freight; USD, United States Dollar

Contribution to final price

For both brands of meters in Hubei, the retail pharmacy mark-up (stage 4) had the largest contribution to the final price at 46% and 57.5%.

In Uganda, a mixed picture was seen. The largest contribution to the final price was the retail mark-up (stage 4) and MSP (stage 1) depending on the brand.

Figure 1. Meters - examples of contribution of mark-ups to the final price



Note: all brands were imported and all tracking started at the district level.
MSP, manufacturers selling price; CIF, cost insurance freight; Stage 1 – insurance & freight; Stage 2- landed costs; Stage 3- wholesale mark-up; Stage 4 – retail mark-up.

Test strips (pack of 50)

Cumulative mark-ups

Cumulative mark-ups on packs of test strips were highly variable, ranging from 44% to 474% (Table 3). Of the 10 country examples, six exceeded 200%.

Mark-ups by stage

Mark-ups on landed costs (stage 2) were far higher in Uganda (37%-55%) than in Hubei (17%). Wholesale mark-ups (stage 3) were 20-30% in Uganda and 11%-22% in Hubei. Retail mark-ups (stage 4) were higher than wholesale mark-ups in both countries. In Uganda, retailers applied 30%-50% mark-ups. In Hubei, retail mark-ups ranged from 18%-86%, depending on whether the strips were locally manufactured or imported. Interestingly, the two locally produced brands had the same MSP and wholesale mark-up but vastly differed on retail pharmacy mark-ups (18% and 86% respectively).

Table 3. Mark-ups for test strips (50)

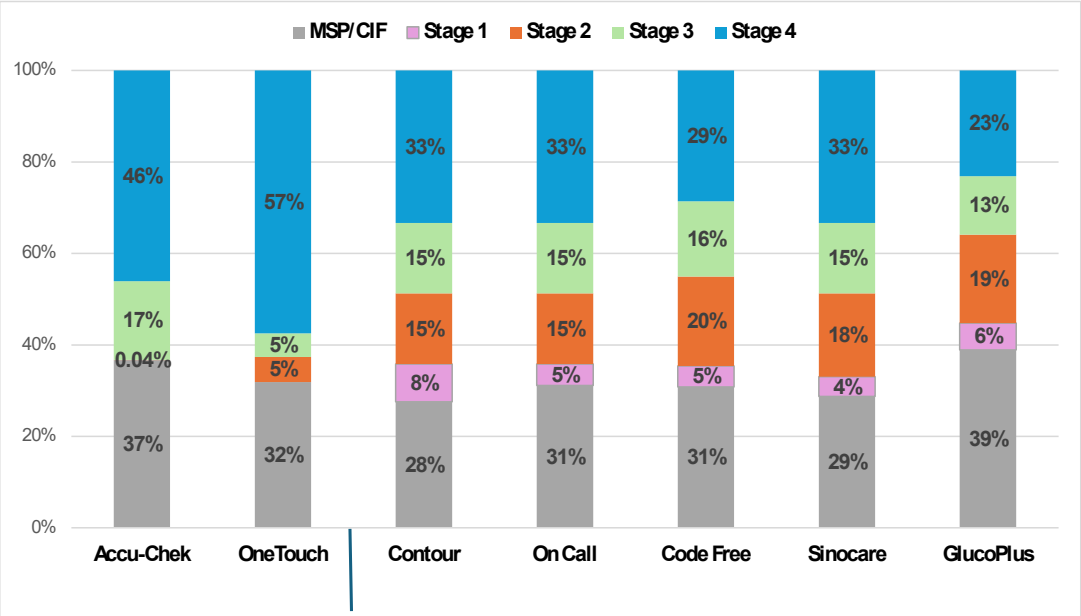
	Hubei, China[6]			Peru		Uganda				
Brand	One Touch	Sino care	Yuwell	Accu-Chek	Nipro	Contour	On Call	Code Free	Sino care	Gluco Plus
Import/ Local	Import	Local	Local	Import	Import	Import	Import	Import	Import	Import
Region	District	District	District	Capital	District	District	District	District	District	District
Stage 1 MSP USD	-	6.3	6.3	6.6	4.8	7.5	2.1	2.5	4.7	9.8
Stage 1 Ins & Freight	-	-	-	4%	1%	30%	15%	15%	15%	15%
Stage 1 CIF USD	20.2	-	-	-	-	-	-	-	-	-
Stage 2 Landed	17%	-	-	unknown		43%	55%	55%	55%	37%
Stage 3 Wholesale	11%	22%	22%			30%	30%	30%	20%	20%
Stage 4 Retail	45%	18%	86%			30%	50%	50%	50%	30%
Stage 5 Dispensed	0%	0%	0%	18%	18%	0%	0%	0%	0%	0%
Cumulative total	88%	44%	127%	276%	474%	215%	248%	248%	221%	146%
Final price USD	37.9	9.2	14.4	25.7	28.3	23.7	7.3	8.7	15.2	24

MSP, manufacturers selling price; CIF, cost insurance freight; USD, United States Dollar

Contribution to final price

In Hubei, in two of the three cases the greatest contribution to the final price was the MSP/CIF price (53% and 69%, respectively) as shown in Figure 2. For the two locally manufactured products (Sinocare and Yuwell), the contributions of the MSP greatly differed (69% verses 44%) as did the retail mark-up (stage 4) at 15% and 46%.

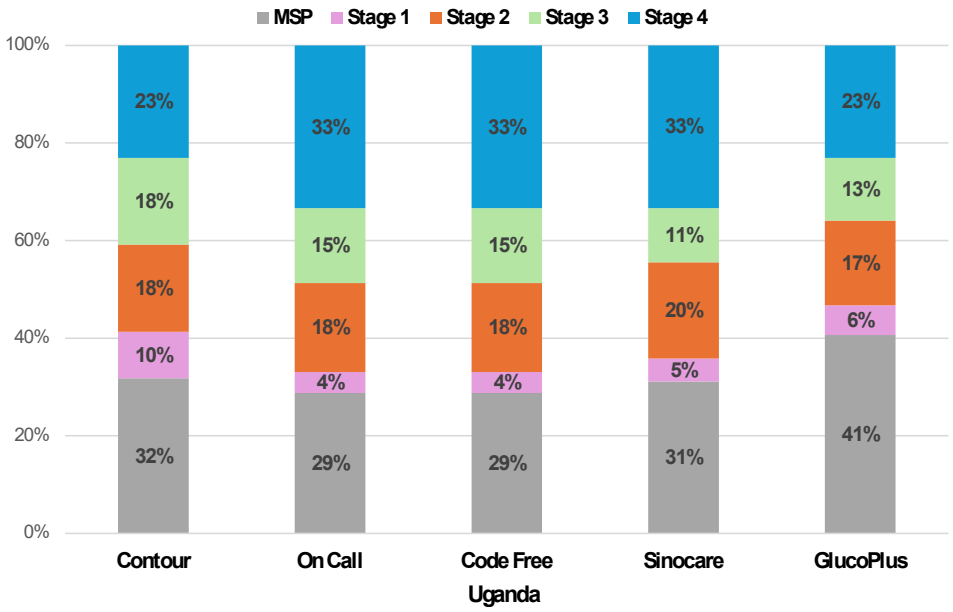
Figure 2. Test strips - examples of contribution of mark-ups to the final price in Hubei



MSP, manufacturers selling price; CIF, cost insurance freight; Stage 1 – insurance & freight; Stage 2- landed costs; Stage 3- wholesale mark-up; Stage 4 – retail mark-up.

A mixed picture was also seen in Uganda (where all five products were imported) - see Figure 3. In three of the five cases, the largest contribution to the final price was the retail mark-up (stage 4). In the other two cases it was the MSP.

Figure 3. Test strips - examples of contribution of mark-ups to the final price in Uganda



Note: tracking started at the district level in all examples. MSP, manufacturers selling price; Stage 1 – insurance & freight; Stage 2- landed costs; Stage 3- wholesale mark-up; Stage 4 – retail mark-up.

Combination packs (meter + 50 strips)

Cumulative mark-ups

Combination packs (a meter plus 50 strips) were only found in Hubei. Cumulative mark-ups ranged from 36% to 251%, with the final prices ranging from 12 USD to 37.9 USD per pack.

Mark-ups by stage

Table 4 shows the mark-up by stages for four brands; two were imported and two were locally produced. The largest mark-up was retail (stage 4), which consisted of the private pharmacy applying a charge (variable across the brands) plus 13% tax on the difference between the retail selling and retail procurement prices. Wholesale mark-ups (stage 3) ranged from 10%-18%, except for one brand where it was 44%.

The meter in the pack was considered to be free-of-charge. However, for the two comparable examples, the price of the combination pack (meter+50 strips) was greater than the price for 50 test strips. For Yuwell (local, district) the final combination pack price was 19.4 USD whereas the price for a pack of strips was 14.4 USD. For Sinocare (local, district) the final prices were 12 USD (combo pack) and 9.2 USD (strips)

Table 4. Examples of mark-ups for combination packs (1 meter+50 test strips), Hubei private sector

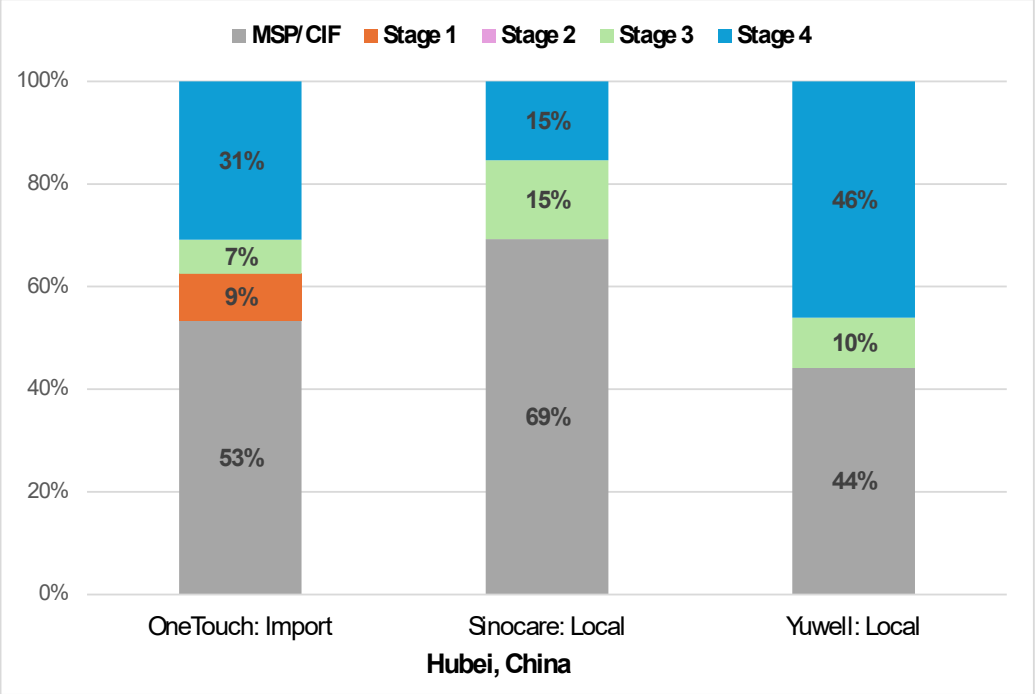
Brand	OneTouch	Contour	Yuwell	Yuwell	Sinocare	Sinocare
Import/Local	Import	Import	Local	Local	Local	Local
Region	Capital	Capital	Capital	District	Capital	District
Stage 1 MSP USD	-	-	6.3	6	8.8	8.8
Stage 1 CIF USD	20.2	14.9	-	-	-	-
Stage 2 Landed	17%	17%	0%	0%	0%	0%
Stage 3 Wholesale	11%	11%	44%	18%	10%	14%
Stage 4 Retail	45%	50%	143%	176%	144%	19%
Cumulative total	88%	88%	251%	225%	169%	36%
Final price USD	37.9	27.9	22.3	19.4	23.7	12

MSP, manufacturers selling price; CIF, cost insurance freight; USD, United States Dollar

Contribution to final price

For the two imported brands, Contour and OneTouch, the greatest contribution to the final price was the CIF price at 53% (Figure 4). For the locally produced packs, the greatest contribution was the retail pharmacy mark-up for three of the four cases (59% - 64%).

Figure 4. Examples of contribution of mark-ups to the final price, combination pack (1 meter + 50 strips), Hubei private sector



MSP, manufacturers selling price; CIF, cost insurance freight; Stage 2- landed costs; Stage 3- wholesale mark-up & tax; Stage 4 – retail mark-up & tax

LIMITATIONS

(1) In each country, data was collected in two regions, tracked back from a limited number of pharmacies and for a limited number of brands. Hence the data cannot be considered representative for the country. They are merely case studies. (2) Actors in the supply chain were often reluctant to divulge buying and selling prices. However, tracking allowed estimation of the MSP. Despite this, the use of field data allows for general impressions.

CONCLUSIONS

It is recommended that people living with type 1 diabetes self-test their blood glucose level up to 10 times a day.[11] High prices of strips impact the number of tests undertaken for people forced to pay for strips out-of-pocket. The price of a meter also matters, as it usually requires a very high one-off payment. While a meter may be supplied free-of-charge, this locks people into using that brand of test strips which may be higher priced or unavailable.

This data shows mark-ups are highly variable depending on brand and location (such as major urban area versus district), and lower manufacturers' selling prices for locally produced brands do not necessarily result in cheaper prices to users of meters and strips. Governments need to control prices and mark-ups of essential medical devices, such as blood glucose meters and strips, to improve the affordability of self-testing especially for people on low wages who use insulin.

END NOTES

1. World Health Organization. *75th World Health Assembly targets for diabetes*. Accessed at https://www.who.int/news-room/feature-stories/detail/first-ever-global-coverage-targets-for-diabetes-adopted-at-the-75-th-world-health-assembly.
2. World Health Organization. *The selection and use of essential in vitro diagnostics.* WHO Technical Report Series 1053, 2023. Accessed at https://iris.who.int/bitstream/handle/10665/373322/9789240081093-eng.pdf.
3. Ewen M, Lepeska M et al. *Availability, prices and affordability of devices for self-monitoring blood glucose levels in low- and middle-income countries* (in publication).
4. Klatman E et al. *Blood glucose meters and test strips: global market and challenges to access in low-resource settings*. Lancet Diabetes Endocrinol. 2019 Feb;7(2):150-160. doi: 10.1016/S2213-8587(18)30074-3.
5. WHO/HAI Measuring medicine prices, availability, affordability and price components 2nd ed, 2008. https://haiweb.org/what-we-do/price-availability-affordability/collecting-evidence-on-medicine-prices-availability/.
6. The most supplied brands were identified by local wholesalers. Brands tracked were Hubei: Accu-Chek Performa, Contour TS, OneTouch Verio Flex, Sinocare Anwen, Yuwell 710; Peru: Accu-Chek Instant, Nipro Premier; Uganda: Code Free, Contour Plus, GlucoPlus, On Call Plus, Sinocare.
7. In Hubei, it was not always possible to find matching brands of meters and strips.
8. Exchange rate on first day of day collection using Oanda: China 1¥=US$0.14084; Peru 1 PEN = US$0.25948; Uganda 1 UGX=US$0.00026.
9. In Hubei, landed costs (stage 2) for imported brands were not available. However, the range of landed costs was obtained from the authorities. The median cost was used in the analyses. For imports and local brands, stages 3 and 4 consisted of a variable fixed mark-up (not a percentage) and tax (11.5% and 13% respectively) on the difference between the selling and procurement prices.
10. In Peru it was only possible to obtain the MSP, insurance and freight cost, retail selling price and tax paid by people (18%).
11. ISPAD Clinical Practice Consensus Guidelines 2022. American Diabetes Association. Standards of Care in Diabetes – 2023.