**Additional file 1**

Bengaluru consists of five administrative zones, namely Bengaluru North, Bengaluru South, Bengaluru East, Bengaluru West and Bengaluru Central. In addition, Bengaluru further expands to peripheral towns. We conducted a representative facility survey – in four randomly selected zones and an additional peripheral town. In each of the five survey zones, we selected one public-sector hospital as the “survey anchor” and one private-sector hospital (i.e. total 10 hospitals). We also obtained insulin price data from the websites of various online pharmacies supplying insulin in Bengaluru.

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| **Table S1a: List of the survey zones and public-sector ‘survey anchor’ hospital facilities** | | | | | | | |
| **S. No.** | **Survey Zone** | | **Public-sector ‘anchor’ hospital facilities (location)** | | | **Bed-count** | |
| 1a.1 | Bengaluru Central | | Victoria Hospital\* (near City Market) | | | 1,000 | |
| 1a.2 | Bengaluru Central± | | Bowring and Lady Curzon Hospital\* (Shivajinagar) | | | 886 | |
| 1a.3 | Bengaluru South | | Jayadeva Institute of Cardiovascular Sciences & Research\* (Jayanagar) | | | 1,150 | |
| 1a.4 | Peripheral Town | | Anekal Taluk Hospital\*\* (Anekal) | | | 100 | |
| 1a.5 | Bengaluru East | | State government health scheme (near Lion’s Airport City Hospital\*\*) | | | 35 | |
| \*Tertiary care hospital; \*\* Secondary care hospital | | | | | | | |
| ±As 2 of the 3 major public sector hospitals in Bengaluru are located in Bengaluru Central, we selected two anchors from the same survey zone. Bengaluru West has neither tertiary nor secondary care facilities in the public sector. | | | | | | | |
| **Table S1b: List of survey districts and private sector hospital facilities** | | | | | | | |
| **S.no.** | | **Survey Zone** | | **Private-sector hospital facilities** | | | **Bed-count** |
| 1b.1 | | Peripheral Town | | Narayana Hrudayalaya\* (Chandapura) | | | 1,000 |
| 1b.2 | | Bengaluru West | | Rajarajeshwari Medical College Hospital\* (Kengeri) | | | 1,300 |
| 1b.3 | | Bengaluru East | | Sri Satya Sai General Hospital\* (Whitefield) | | | 330 |
| 1b.4 | | Bengaluru South | | Sagar Apollo Hospital\* (Jayanagar) | | | 250 |
| 1b.5 | | Bengaluru Central | | Mallya Hospital\* (Vittal Mallya Road) | | | 220 |
| Note: Private sector hospitals do not serve as survey anchors, and were surveyed only due to its vast dominance over the public sector healthcare in Bengaluru district. | | | | | | | |
| **Table S1c: List and web links of the surveyed online private-sector pharmacies** | | | | | | | |
| 1c.1 | | 1mg | | | <https://www.1mg.com/> | | |
| 1c.2 | | Apollo | | | <https://www.apollopharmacy.in/> | | |
| 1c.3 | | MedPlus | | | <https://www.medplusmart.com/> | | |
| 1c.4 | | NetMeds | | | <https://www.netmeds.com/> | | |

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| **Table S2: Occurrence of insulin (any brand or company) in the private-sector retail pharmacies in Bengaluru region, India** | | | | |
| **Insulin type** | **Molecule description** | **Strength** | **Brand (company)** | **Occurrence % (n)** |
| **Human insulin** | Soluble insulin | 40 IU/ml | Insugen R (Biocon) | 44.82% (13) |
| H.Actrapid (Novo Nordisk) | 82.75% (24) |
| Huminsulin R (Eli Lilly) | 6.89% (2) |
| 100 IU/ml | Wosulin R (Wockhardt) | 10.34% (3) |
| H. Actrapid (Novo Nordisk) | 31.03% (9) |
| Insugen R (Biocon) | 10.34% (3) |
| Isophane insulin | 40 IU/ml | H. Insulatard (Novo Nordisk) | 20.68% (6) |
| Insugen N (Biocon) | 51.72% (15) |
| Huminsulin N (Eli Lilly) | 17.24% (5) |
| 100 IU/ml | Insulatard (Novo Nordisk) | 17.24% (5) |
| Insugen N (Biocon) | 10.34% (3) |
| Biphasic isophane insulin: 30% soluble insulin 70% isophane insulin | 40 IU/ml | Insugen (Biocon) | 44.82% (13) |
| H. Mixtard (Novo Nordisk) | 93.10% (27) |
| Lupisulin M30 (Lupin) | 34.48% (10) |
| Insucare M30 (Ranbaxy) | 13.79% (4) |
| Huminsulin (Eli Lilly) | 58.62% (17) |
| 100 IU/ml | Insugen (Biocon) | 44.82% (13) |
| Huminsulin (Eli Lilly) | 27.58% (8) |
| Mixtard (Novo Nordisk) | 51.72% (15) |
| Biphasic isophane insulin: 50% soluble insulin 50% isophane insulin | 40 IU/ml | Insugen 50/50 (Biocon) | 13.79% (4) |
| H. Mixtard 50 (Novo Nordisk) | 6.89% (2) |
| 100 IU/ml | Mixtard 50 (Novo Nordisk) | 3.44% (1) |
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| **Analogue insulin** | Insulin aspart | 100 IU/ml | Novorapid (Novo Nordisk) | 34.48% (10) |
| Biphasic insulin aspart: 30% insulin aspart & 70% protamine crystallized aspart | 100 IU/ml | Novomix 30 (Novo Nordisk) | 37.93% (11) |
| Insulin glargine | 100 IU/ml | Basalog (Biocon) | 27.58% (8) |
| Lantus (Sanofi) | 58.62% (17) |
| Insulin glulisine | 100 IU/ml | - | - |
| Insulin lispro | 100 IU/ml | Humalog Plain (Eli Lilly) | 6.89% (2) |
| Insulin lispro biphasic injection: 25% insulin lispro 75% lispro protamine | 100 IU/ml | Humalog 25 (Eli Lilly) | 10.34% (3) |
| Eglucent Mix 25 (Lupin) | 3.44% (1) |
| Insulin lispro biphasic injection: 50% insulin lispro 50% lispro protamine | 100 IU/ml | Humalog 50 Kwikpen (Eli Lilly) | 20.68% (6) |
| Insulin detemir | 100 IU/ml | Levemir (Novo Nordisk) | 3.44% (1) |

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| **Table S3: Occurrence of insulin (any brand or company) in the public-sector hospitals in Bengaluru region, India** | | | | |
| **Insulin type** | **Molecule description** | **Strength** | **Brand (company)** | **Occurrence % (n)** |
| **Human insulin** | Soluble insulin | 40 IU/ml | H. Actrapid (Novo Nordisk) | 60% (3) |
| Insugen R (Biocon) | 20% (1) |
| Humarap (Cadila Healthcare) | 20% (1) |
| 100 IU/ml | H. Actrapid (Novo Nordisk) | 20% (1) |
| Isophane insulin | 40 IU/ml | Insugen N (Biocon) | 20% (1) |
| 100 IU/ml | - | - |
| Biphasic isophane insulin: 30% soluble insulin 70% isophane insulin | 40 IU/ml | Insugen (Biocon) | 60% (3) |
| H.Mixtard (Novo Nordisk) | 60% (3) |
| Humstard (Cadila Healthcare) | 20% (1) |
| Lupisulin M30 (Lupin) | 20% (1) |
| 100 IU/ml | H. Mixtard (Novo Nordisk) | 60% (3) |
| Insugen (Biocon) | 20% (1) |
| Huminsulin (Eli Lilly) | 20% (1) |
| Biphasic isophane insulin: 50% soluble insulin 50% isophane insulin | 40 IU/ml | Huminsulin 50/50 (Eli Lilly) | 20% (1) |
| 100 IU/ml | - | - |
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| **Analogue insulin** | Insulin aspart | 100 IU/ml | Novorapid (Novo Nordisk) | 20% (1) |
| Biphasic insulin aspart: 30% insulin aspart & 70% protamine crystallized aspart | 100 IU/ml | Novomix 30 (Novo Nordisk) | 40% (2) |
| Insulin glargine | 100 IU/ml | Basalog (Biocon) | 40% (2) |
| Lantus Solostar (Sanofi) | 20% (1) |
| Insulin glulisine | 100 IU/ml | - | - |
| Insulin lispro | 100 IU/ml | - |  |
| Insulin lispro biphasic injection: 25% insulin lispro 75% lispro protamine | 100 IU/ml | - | - |
| Insulin lispro biphasic injection: 50% insulin lispro 50% lispro protamine | 100 IU/ml | Humalog 50 Kwikpen (Eli Lilly) | 20% (1) |
| Insulin detemir | 100 IU/ml | - | - |

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| **Table S4 : Occurrence of insulin (any brand or company) in the private-sector hospitals in Bengaluru region, India** | | | | |
| **Insulin type** | **Molecule description** | **Strength** | **Brand (company)** | **Occurrence % (n)** |
| **Human insulin** | Soluble insulin | 40 IU/ml | H. Actrapid (Novo Nordisk) | 40% (2) |
| Insugen R (Biocon) | 60% (3) |
| Huminsulin R (Eli Lilly) | 40% (2) |
| 100 IU/ml | H. Actrapid (Novo Nordisk) | 80% (4) |
| Isophane insulin | 40 IU/ml | Insugen N (Biocon) | 80% (4) |
| Huminsulin N (Eli Lilly) | 60% (3) |
| Insulatard (Novo Nordisk) | 20% (1) |
| 100 IU/ml | Insulatard (Novo Nordisk) | 20% (1) |
| Biphasic isophane insulin: 30% soluble insulin 70% isophane insulin | 40 IU/ml | Insugen (Biocon) | 40% (2) |
| Huminsulin (Eli Lilly) | 40% (2) |
| H.Mixtard (Novo Nordisk) | 80% (4) |
| H.Monotard (Novo Nordisk) | 20% (1) |
| Wosulin (Wockhardt) | 20% (1) |
| Lupisulin M30 (Lupin) | 20% (1) |
| 100 IU/ml | H. Mixtard (Novo Nordisk) | 100% (5) |
| Insugen (Biocon) | 60% (3) |
| Huminsulin (Eli Lilly) | 20% (1) |
| Biphasic isophane insulin: 50% soluble insulin 50% isophane insulin | 40 IU/ml | Huminsulin 50/50 (Eli Lilly) | 20% (1) |
| Wosulin 50/50 (Wockhardt) | 20% (1) |
| 100 IU/ml | - | - |
|  | | | | |
| **Analogue insulin** | Insulin aspart | 100 IU/ml | Novorapid (Novo Nordisk) | 60% (3) |
| Biphasic insulin aspart: 30% insulin aspart & 70% protamine crystallized aspart | 100 IU/ml | Novomix 30 (Novo Nordisk) | 20% (1) |
| Insulin glargine | 100 IU/ml | Basalog (Biocon) | 40% (2) |
| Lantus Solostar (Sanofi) | 60% (3) |
| Insulin glulisine | 100 IU/ml | - | - |
| Insulin lispro | 100 IU/ml | Humalog Plain (Eli Lilly) | 20% (1) |
| Insulin lispro biphasic injection: 25% insulin lispro 75% lispro protamine | 100 IU/ml | - | - |
| Insulin lispro biphasic injection: 50% insulin lispro 50% lispro protamine | 100 IU/ml | Humalog 50 Kwikpen (Eli Lilly) | 60% (3) |
| Insulin detmir | 100 IU/ml | Levemir (Novo Nordisk) | 20% (1) |
| **Porcine insulin** | Neutral porcine solution | 40IU/ml | Actrapid Mc (Novo Nordisk) | 20% (1) |
| Porcine zinc suspension | 40 IU/ml | Zinulin (Nicholas Pharma) | 20% (1) |

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| **Table S5: Comparison of availability of insulin products – Chain pharmacy Vs. Independent pharmacy** | | | | |
| **Insulin type** | **Description** | **Presentation** | **Private retail sector** | |
| **Chain pharmacy (n=10)** | **Independent pharmacy (n=20)** |
| **Human insulin** | Soluble insulin | Vial (40 IU/ml)\* | 90% (n=9) | 80% (n=16) |
| Vial (100 IU/ml) | 70% (n=7) | 5% (n=1) |
| Pen (100 IU/ml) | 40% (n=4) | 5% (n=1) |
| Isophane insulin | Vial (40 IU/ml)\* | 100% (n=10) | 35% (n=7) |
| Vial (100 IU/ml) | 30% (n=3) |  |
| Pen (100 IU/ml) | 40% (n=4) | 5% (n=1) |
| Biphasic isophane insulin: 30% soluble insulin 70% isophane insulin | Vial (40 IU/ml) \* | 100% (n=10) | 90% (n=18) |
| Vial (100 IU/ml) | 70% (n=7) | 55% (n=11) |
| Pen (100 IU/ml) | 40% (n=4) | 10% (n=2) |
| Cartridge (100 IU/ml) | 60% (n=6) | 10% (n=2) |
| Biphasic isophane insulin: 50% soluble insulin 50% isophane insulin | Vial (40 IU/ml) | 30% (n=3) | 15% (n=3) |
| Vial (100 IU/ml) | 0 | 0 |
| Pen (100 IU/ml) | 0 | 0 |
| Cartridge (100 IU/ml) | 0 | 5% (n=1) |
| **Analogue insulin** | Insulin aspart | 100 IU/ml | 50% (n=5) | 25% (n=5) |
| Biphasic insulin aspart: 30/70 | 100 IU/ml | 90% (n=9) | 10% (n=2) |
| Insulin glargine | 100 IU/ml | 40% (n=4) | 10% (n=2) |
| 100 IU/ml | 70% (n=7) | 55% (n=11) |
| Insulin glulisine | 100 IU/ml | 0 | 0 |
| Insulin detemir | 100 IU/ml | 0 | 5% (n=1) |
| Insulin lispro | 100 IU/ml | 20% (n=2) | 0 |
| Insulin lispro biphasic 25/75 | 100 IU/ml | 10% (n=1) | 15% (n=3) |
| Insulin lispro biphasic 50/50 | 100 IU/ml | 50% (n=5) | 5 % (n=1) |
| **Mean availability of insulin listed on India’s 2015 Essential Medicines List** | | | **96.7%** | **68.3%** |

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| **Table S6: Affordability of insulin in Bengaluru region, India** | | | | |
| **6a. Private sector (Retail pharmacies and hospital pharmacies)** | | | | |
|  | **Median cost / 100 IU; 10ml vial (all companies)** | **Monthly Per capita cost of insulin (~ 1.2 vials or 1200 IU)** | **Ratio (monthly per capita insulin cost / per capita monthly health spending)** | **Number of man-days (unskilled labour) to pay for monthly insulin supply for a T1DM Child** |
|  |  |  |  |  |
| Human Vial | 323.5 | 388.2 | 0.91 | 1.4 |
| Human Cartridge | 796.6 | 955.92 | 2.26 | 3.45 |
| Human pen | 1170 | 1404 | 3.32 | 5.06 |
| Analogue Vial | 1168.8 | 1402.56 | 3.31 | 5.05 |
| Analogue Cartridge | 1794 | 2152.8 | 5.09 | 7.76 |
| Analogue pen | 2160 | 2592 | 6.12 | 9.34 |
| Porcine Vial | **302.95** | **363.54** | **0.86** | **1.31** |
| **6b. Public sector hospital pharmacies** | | | | |
|  | **Median cost /100 IU 10ml vial ( all companies)** | **Per capita cost of monthly insulin supply (~ 1.2 vials or 1200 IU)** | **Ratio (monthly per capita insulin cost compared to India’s per capita monthly health spending)** | **Number of man-days (unskilled labour) to pay for monthly insulin supply for a T1DM Child** |
| Human Vial | 321 | 385.2 | 0.91 | 1.39 |
| Human Cartridge | 881.6 | 1057.92 | 2.5 | 3.81 |
| Human pen | 1170 | 1404 | 3.32 | 5.06 |
| Analogue Vial | 1232.8 | 1479.36 | 3.49 | 5.33 |
| Analogue Cartridge | 1590 | 1908 | 4.51 | 6.87 |
| Analogue pen | 2136.65 | 2563.98 | 6.06 | 9.24 |
| The prices (INR) of all surveyed insulin products with variable pack sizes (milliliters) and strength were adjusted to 10 ml 100 IU/ml pack for purpose of comparisons. Per capita monthly insulin need is calculated based on WHO daily defined dose of 40 IU/day (i.e. 1200 IU/month). The wage of a lowest paid unskilled worker in Bengaluru region during the time of survey was Rs. 8,322 per month (i.e. daily wage of Rs. 277.4) The 2013 annual per capita health expenditure (both public and private sectors combined) was USD 78.0 (Rs. 5075.85) i.e. monthly USD 6.5 (Rs. 422.99) | | | | |

**Wholesaler interview guide**

* On what basis do you decide on what insulin products to stock/supply?
* In Bangalore market, we found that more pharmacies stocked insulin products by non-Indian companies (Novo, Lily, Sanofi) compared to those by Indian companies (Biocon, Wockhardt, Cadila). What do you think is the reason?
* We noticed that, compared to findings from a study in Delhi state, the private retail pharmacies in Bengaluru have relatively more insulin products by Indian companies such as Biocon and Cadilla. What might be the reason for such difference between Delhi and Bangalore? Please answer based on your best understanding.
* In our quantitative analyses, we observed that a high proportion of surveyed pharmacies stock insulin analogue products (such as glargine). Why so many pharmacies have analogues (and cartridge/pen devices) while the government’s essential medicine list on include human insulin.
* Among all human insulin products, which product and company has higher demand? Is Actrapid (and Mixtard) one of the high sales volume product, if yes what could be the reasons?
* What are your views on the online pharmacies? We found that most of the insulin products are sold by online pharmacies and some even offer cheaper prices compared to the private retail pharmacies. Comments?
* Compared to private retail sector, the public (government hospitals) have more Indian insulin products than non-Indian products. What might be the reason? Your thoughts?
* Do patients ever buy insulin directly from wholesalers? If yes, please explain what could be the reasons?
* Can you provide us the wholesaler selling prices of insulin products that you supply (on basis of anonymity)?