

ONLINE SUPPLEMENTARY APPENDIX

Webtable 1: Survey facilities random sampling

Delhi, also known as the National Capital Territory (NCT) of Delhi, is divided into total 11 districts namely New Delhi, North Delhi, North West Delhi, West Delhi, South West Delhi, South Delhi, South East Delhi, Central Delhi, North East Delhi, Shahdara, and East Delhi. Out of these 11 districts, we selected a systematic random sample of eight survey districts. In each of the selected districts, a public sector hospital was selected as ‘survey anchor’ (mentioned below).

List of the survey districts and public-sector ‘survey anchor’ hospital facilities		
	Survey districts	Public-sector survey anchor hospital facilities (location)
1	New Delhi	Ram Manohar Lohia hospital (President's Estate)
2	East Delhi	Lal Bahadur Shastri hospital (Khichripur)
3	North West Delhi	Dr. Baba Saheb Ambedkar hospital (Rohini)
4	West Delhi	Acharya Shree Bhikshu hospital (Moti Nagar)
5	South Delhi	Madan Mohan Malviya hospital (Malviya Nagar)
6	South West Delhi	Rao Tula Ram Memorial hospital (Jaffarpur Kalan)
7	Central Delhi	Govind Ballabh Pant hospital (Jawaharlal Nehru Marg)
8	North East Delhi	Jag Prवेश Chandra hospital (Shastri park)

Note: The list of all the district-specific public-sector hospitals in Delhi state (sampling pool) was obtained from the Government of Delhi website¹

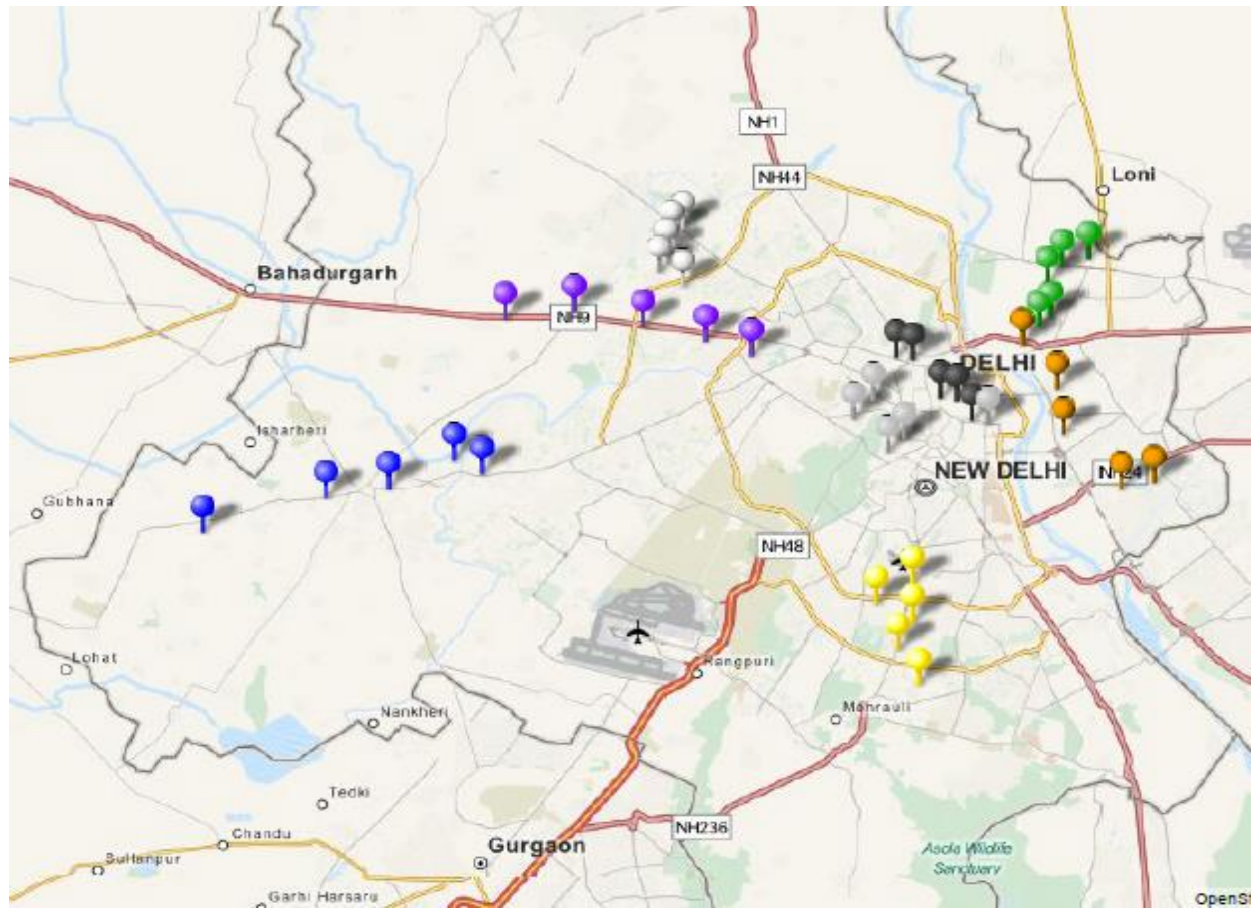


Figure: Map indicates the surveyed private-sector retail pharmacies (colored pins) in each of the eight districts. This map is generated based on the GPS coordinates collected at the site of surveyed retail pharmacy. The dark gray outline roughly marks the borders of the Delhi state, India.

Webtable 2. Public-sector insulin procurement prices (USD)

Insulin	Procurement price per 100 IU 10 ml vial (USD)	Health department (year)	Price source
Soluble insulin; 40 IU/ml	2.3922	Government of NCT of Delhi 2014	Colleagues at local university
Soluble insulin; 40 IU/ml	1.8961	Government of NCT of Delhi 2013	Colleagues at local university
Soluble insulin; 40 IU/ml	2.4927	Municipal Corporation of Delhi (MCD) 2013	Colleagues at local university
Soluble insulin (Human insulin R); 40 IU/ml	2.5371	Municipal Corporation of Delhi 2013	MCD Price booklet
Soluble insulin (Human insulin R); 40 IU/ml	2.3298	Government of NCT of Delhi 2013	Lok Nayak hospital e-tender
Soluble insulin (Human insulin R) 100 IU/ml	2.2874	Government of NCT of Delhi 2013	Lok Nayak hospital e-tender
Biphasic isophane 30/70 insulin; 40 IU/ml	2.3923	Government of NCT of Delhi 2014	Colleagues at local university
Biphasic isophane 30/70 insulin; 40 IU/ml	2.3923	Government of NCT of Delhi 2014	Colleagues at local university
Biphasic isophane 30/70 insulin; 40 IU/ml	2.4927	Municipal Corporation of Delhi 2013	MCD Price booklet
Biphasic isophane 30/70 insulin; 40 IU/ml	2.3298	Government of NCT of Delhi 2013	Lok Nayak hospital e-tender
Biphasic isophane 30/70 insulin; 40 IU/ml	3.0257	Government of NCT of Delhi 2013	Baba Saheb Ambedkar hospital online documents
Human insulin 50/50; 40 IU/ml	2.0776	Central government (2013)	Colleagues at local university
Human insulin 50/50; 100 IU/ml	14.8244	Central government (2013)	Central government rate contract - 138

Public-sector procurement prices refer to the price at which the government or public-sector hospitals procured insulin. We obtained these prices from colleagues at a local university and also performed web searches to find public-sector medicine procurement and rate contract documents uploaded on governments' and hospitals' websites.

Insulin molecule	Strength
Insulin Soluble (Human)	40 IU/ml
Insulin NPH (Human)	40 IU/ml
Insulin Premixed (Human) 30%/70%	40 IU/ml
Insulin Premixed (Human) 30%/70%	100 IU/ml
Insulin Glargine (Human)	100 IU/ml
Insulin Lispro / Apart / Inj. Glulisine	100 IU/ml

Insulin type and delivery device		Place of company's corporate headquarters		
		Indian	Foreign	Combined (both Indian and foreign)
		Percent availability (n)	Percent availability (n)	Percent availability (n)
Human insulin (All molecules)		25.0% (10)	90.0% (36)	90.0% (36/40)
Vial	40 IU/ml	20.0% (8)	77.5% (31)	77.5% (31)
	100 IU/ml	0.0% (0)	15.0% (6)	15.0% (6)
Cartridge	40 IU/ml	0.0% (0)	2.5% (1)	2.5% (1)
	100 IU/ml	7.5% (2)	25.0% (9)	25.0% (9)
Pen	40 IU/ml	0.0% (0)	0.0% (0)	0.0% (0)
	100 IU/ml	0.0% (0)	22.5% (4)	22.5% (4)
Analogue insulin (All molecules)		5.0% (2/40)	32.5% (13/40)	32.5% (13)
Vial	40 IU/ml	0.0% (0)	0.0% (0)	0.0% (0)
	100 IU/ml	0.0% (0)	0.0% (0)	0.0% (0)
Cartridge	40 IU/ml	0.0% (0)	0.0% (0)	0.0% (0)
	100 IU/ml	5.0% (2)	17.5% (7)	17.5% (7)
Pen	40 IU/ml	0.0% (0)	0.0% (0)	0.0% (0)
	100 IU/ml	0.0% (0)	22.5% (9)	22.5% (9)

Webtable 5: Occurrence of insulin (any brand or company) in the private-sector market in Delhi state, India					
Insulin type	Molecule description	Strength	Brand (company)	Occurrence	
Human insulin	Soluble insulin	40 IU/ml*	Actrapid HM (Novo Nordisk)	40.0% (16)	
			Huminsulin NPH (Lilly)	7.5% (3)	
			Huminsulin R (Lilly)	7.5% (3)	
			Wosulin R (Wockhardt)	5.0% (2)	
			Human Actrapid (Novo Nordisk)	2.5% (1)	
			Human Actrapid (Novo Nordisk)	2.5% (1)	
			Lupisulin (Lupin)	2.5% (1)	
		100 IU/ml	Huminsulin R (Lilly)	5.0% (2)	
			Actrapid HM (Novo Nordisk)	5.0% (2)	
			Human Actrapid (Novo Nordisk)	2.5% (1)	
		Isophane insulin	40 IU/ml*	Human Insultard (Novo Nordisk)	17.5% (7)
				Huminsulin NPH (Lilly)	12.5% (5)
				Huminsulin N (Lilly)	2.5% (1)
				100 IU/ml	Huminsulin N (Lilly)
	Huminsulin NPH (Lilly)				2.5% (1)
	Human Insultard (Novo Nordisk)		2.5% (1)		
	Biphasic isophane insulin: 30% soluble insulin 70% isophane insulin		40 IU/ml*	Human Mixtard (Novo Nordisk)	50% (20)
				Huminsulin 30/70 (Lilly)	40.0% (16)
		Insugen 30/70 (Biocon)		7.5% (3)	
		Lupisulin M30 (Lupin)		5.0% (2)	
		Wosulin 30/70 (Wockhardt)		5.0% (2)	
Insucare M30 (Ranbaxy)		2.5% (1)			
100 IU/ml*		Huminsulin 30/70 (Lilly)	22.55 (9)		
		Mixtard 30 HM (Novo Nordisk)	20.0% (8)		
		Human Mixtard (Novo Nordisk)	5.0% (2)		
		Mixtard 30 (Novo Nordisk)	5.0% (2)		
		Lupisulin M30 (Lupin)	5.0% (2)		

			Wosulin 30/70 (Wockhardt)	5.0% (2)
			Mixtard 30 Flexpen (Novo Nordisk)	2.5% (1)
	Biphasic isophane insulin: 50% soluble insulin 50% isophane insulin	40 IU/ml	Human Mixtard 50 (Novo Nordisk)	15.0% (6)
			Huminsulin 50/50 (Lilly)	7.5% (3)
			Insugen 50/50 (Biocon)	7.5% (3)
		100 IU/ml	Mixtard 50 HM (Novo Nordisk)	5.0% (2)
Analogue insulin	Insulin aspart	100 IU/ml*	NovoRapid (Novo Nordisk)	12.5% (5)
	Biphasic insulin aspart: 30% insulin aspart & 70% protamine crystallized aspart	100 IU/ml	Novo Mix 30 (Novo Nordisk)	15.0% (6)
	Biphasic insulin aspart: 50% insulin aspart & 50% protamine crystallized aspart	100 IU/ml	Novo Mix 30 (Novo Nordisk)	2.5% (1)
	Insulin glargine	100 IU/ml*	Lantus Solostar (Sanofi)	15.0% (6)
			Lantus (Sanofi)	7.5% (3)
			Basugine (Lupin)	5.0% (2)
	Insulin glulisine	100 IU/ml*	Apidra Solostar (Sanofi)	2.5% (1)
			Apidra (Sanofi)	2.5% (1)
	Insulin lispro	100 IU/ml*	Humalog (Lilly)	5.0% (2)
Insulin lispro biphasic injection: 25% insulin lispro 75% lispro protamine	100 IU/ml	Humalog Mix 25 (Lilly)	12.5% (5)	
Insulin lispro biphasic injection: 50% insulin lispro 50% lispro protamine	100 IU/ml	Humalog Mix 50 (Lilly)	12.5% (5)	
Mean availability of human insulins listed on 2013 Delhi essential medicine list				
Mean availability of analogue insulin listed on 2013 Delhi essential medicine list				
* Insulins listed on the 2013 Delhi essential medicines list				

	Combined (company of any origin) Median consumer price (1)	Indian company Median consumer price (2)	Foreign company Median consumer price (3)	p-value (4)
Human insulin				
Vial	USD 5.6	USD 5.6	USD 6.2	0.0840*
Cartridge	USD 11.2	USD 8.1	USD 11.7	0.4467
Pen	USD 18.5	#	USD 18.5	--
Analogue insulin				
Vial	#	#	#	--
Cartridge	USD 24.9	USD 26.4	USD 24.5	0.6394
Pen	USD 32.8	#	USD 70.1	

	Median unit 100 IU 10ml vial cost (overall: company of any origin)	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 days per month an unskilled lowest worker will have to work to pay for his or child's (Type 1 diabetes) monthly insulin supply
Human Vial	Rs. 350.0 USD 5.6	Rs. 420.0 USD 6.78	1.15	1.47
Human Cartridge	Rs. 693.3 USD 11.2	Rs. 831.96 USD 13.43	2.28	2.92
Human Pen	Rs. 1145.0 USD 18.5	Rs. 1374.00 USD 22.17	3.76	4.82
Analogue Vial	#			
Analogue Cartridge	Rs. 1546.7 USD 24.96	Rs. 1856.04 USD 29.95	5.08	6.51
Analogue Pen	Rs. 2033.0 USD 32.8	Rs. 2439.6 USD 39.37	6.68	8.56

The prices (collected in Indian Rupees) of all survey 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. The wage of a lowest paid unskilled worker during the time of survey was Rs. 8554 per month (i.e. daily wage of Rs. 285.1).² The 2013 annual per capita health expenditure (both public and private sectors combined) was USD 69.0 (Rs. 4,275.9) i.e. monthly USD 5.74 (Rs. 365.33).³

Webtable 8: Price components of the internationally manufactured (imported) insulin products found in the private-sector market in Delhi state

Insulin molecule [Number of products found in facility survey]	Product brand (company)	Country of Manufacture	Package form	Percentage mark-ups		
				Import to wholesale price (per ml)	Wholesale to consumer price (per ml)	Import to consumer price (per ml)
Human insulin						
Soluble insulin 100 IU/ml [3]	Huminsulin R® (Lilly)	Egypt	Vial	16.72%	18.76%	38.62%
	Human Actrapid® (Novo Nordisk)	Brazil	Cartridge	26.95%	19.34%	51.50%
	Human Actrapid® (Novo Nordisk)	Denmark	Pen	**	16.57%	**
Isophane insulin 100 IU/ml [3]	Huminsulin® N (Lilly)	Egypt	Vial	14.90%	18.74%	36.43%
	Huminsulin® NPH (Eli Lilly)	France	Cartridge	16.73%	17.64%	37.33%
	Human Insultard® (Novo Nordisk)	Brazil	Cartridge	14.46%	24.87%	42.93%
Biphasic isophane insulin: 30% sol 70% isophane 100 IU/ml [5]	Human Mixtard® (Novo Nordisk)	Denmark	Vial	**	22.52%	**
	Huminsulin® 30/70 (Lilly)	Egypt	Vial	11.18%	24.96%	38.94%
	Huminsulin® 30/70 (Eli Lilly)	France	Cartridge	16.21%	24.43%	44.61%
	Mixtard® 30 HM (Novo Nordisk)	Brazil	Cartridge	33.41%	16.06%	54.83%
	Mixtard® 30 HM (Novo Nordisk)	Denmark	Pen	27.23%	24.55%	58.46%
Biphasic isophane insulin: 50% sol 50%	Mixtard® 50 HM (Novo Nordisk)	Denmark	Cartridge	26.46%	19.34%	50.92%

isophane 100 IU/ml [1]							
Analogue insulin							
Insulin Aspart 100 IU/ml [1]	Novo Rapid® (Novo Nordisk)	Denmark	Pen	20.71%	24.87%	50.73%	
Biphasic insulin aspart: Insulin Aspart & Protamine crystallized Aspart 30/70; 100 IU/ml [1]	Novo Mix® 30 (Novo Nordisk)	Brazil	Cartridge	25.84%	13.98%	43.43%	
	Novo Mix® 30 (Novo Nordisk)	Brazil & Denmark	Pen	8.44%	24.83%	35.37%	
Biphasic insulin aspart: Insulin Aspart & Protamine crystallized Aspart 50/50; 100 IU/ml. [1]	Novo Mix® 50 (Novo Nordisk)	Denmark	Pen	15.98%	31.0%	51.99%	
Insulin glargine 100 IU/ml [3]	Lantus® (Sanofi-Aventis)	Germany	Cartridge	11.47%	29.40%	44.24%	
	Basugine® (Lupin)	China	Cartridge	74.68%	30.85%	128.57%	
	Lantus® Solostar (Sanofi-Aventis)	Germany	Pen	**	82.48%	**	
Insulin glulisine 100 IU/ml [2]	Apidra® (Sanofi-Aventis)	Germany	Cartridge	##	##	41.26%	
	Apidra Solostar® (Sanofi-Aventis)	Germany	Pen	##	##	43.73%	
Insulin lispro 100 IU/ml [1]	Humalog® (Eli Lilly®)	Italy	Cartridge	5.31%	19.07%	25.40%	
Insulin Lispro Biphasic injection: 25% insulin lispro	Humalog® Mix (Eli Lilly)	Italy & USA	Cartridge	6.20%	24.46%	32.17%	
	Humalog® Mix 25 (Eli Lilly)	USA	Pen	**	19.20%	**	

75% lispro protamine; 100 IU/ml [2]							
Insulin Lispro Biphasic injection: 50% insulin lispro 50% lispro protamine; 100 IU/ml [2]	Humalog® Mix 50 (Eli Lilly)	France & USA	Cartridge	6.22%	22.04%	29.63%	
	Humalog® Mix 50 (Eli Lilly)	USA	Pen	5.23%	19.20%	25.43%	
Median (Min; Max) percentage mark up	Human insulin			16.77% (11.18%; 33.41%)	19.34% (16.06%; 25.0%)	43.77% (36.43; 58.46)	
	Analogue insulin			9.96 (5.29; 74.68)	24.65 (13.98; 82.48)	38.32 (16.49; 128.56)	
** Import price not available; ## Available price data point was higher than the succeeding supply chain price point. In other words, either import or wholesale price was higher than wholesale or consumer price, respectively.							

References:

1. Health and family Welfare, Government of NCT of Delhi. [District-wise list of public-sector hospitals] Accessed on 6 June, 2016. http://www.delhi.gov.in/wps/wcm/connect/DoIT_Health/health/our+services/map+info+delhi+govt.+hospitals
2. Minimum wages revised in Delhi w.e.f. 01st Apr 2014. Labor Law Reporter. Accessed on 6 June, 2016. <http://www.labourlawreporter.com/1915>
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