



# Factors Driving Reproductive Health Supply Costs in Developing Countries

Team 3

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# Agenda

- Problem & Goal Statement
- Data Source
- Data clean-up
- Exploration
- Models
- Results
- Conclusion





# Problem & Goal Statement

## Problem

Due to lack of technical expertise and resources John Snow, Inc. (JSI) has had difficulty understanding the Reproductive Health Interchange database and creating a more cost efficient contraceptive procurement process

## Goal

Our goal was to use explanatory data mining techniques to gain a better understanding of the driving input variables and suggest alternative procurement strategies





# Data Source

## Source

John Snow, Inc. (JSI) is a public health research and consulting firm dedicated to improving the health of individuals and communities throughout the world

Reproductive Health Interchange (RHI) is a global partnership of public, private and NGOs dedicated to ensuring that all people in low- and middle-income countries can access affordable, high-quality supplies to ensure better reproductive health

## Data

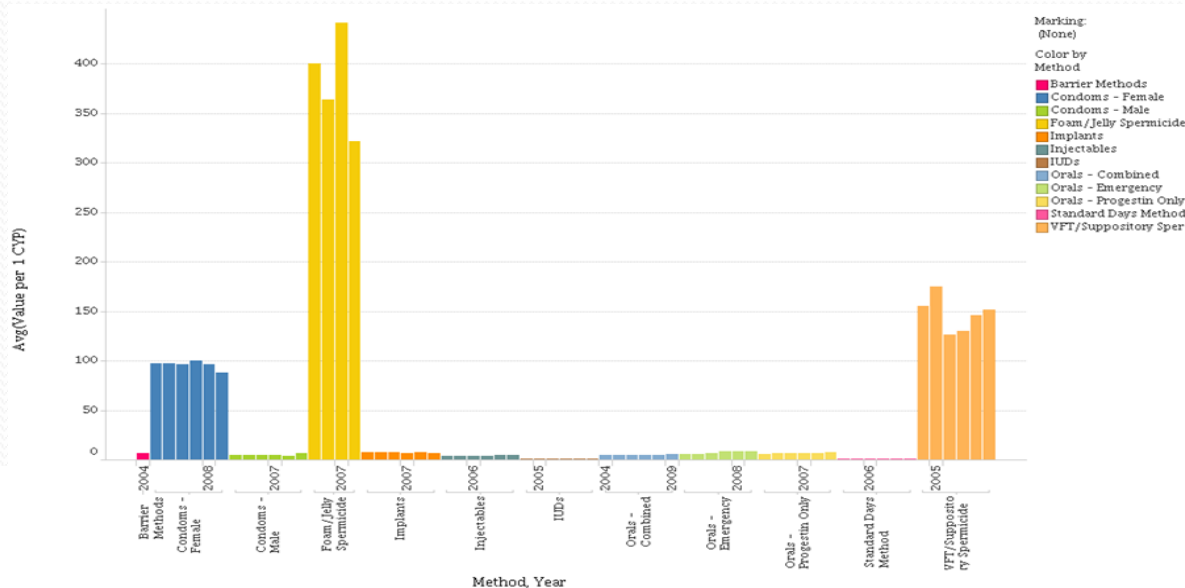
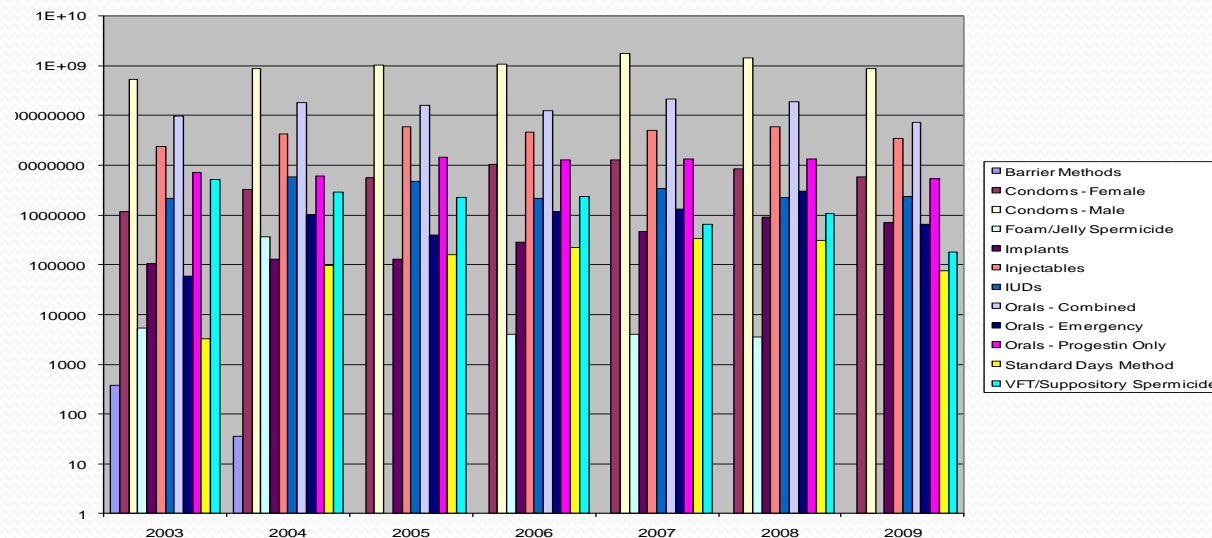
The dataset consists of over 15,000 rows of records with eleven variables of reproductive supply shipments to 155 countries across the world





# Data Clean-up

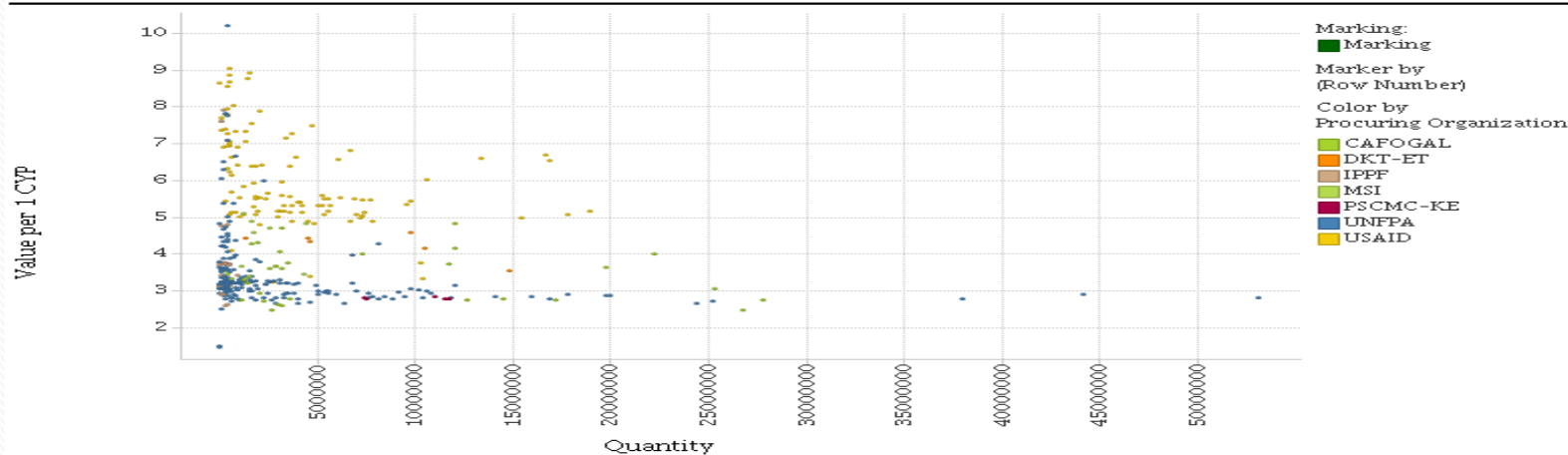
- The original data had shipment records from 1995 to 2009 with 11 variables.
- After preliminary technical analysis and recommendation of JSI, we focused on the data from 2004 on and 8 variables
- The remaining variables were: year, funding source, procurement source, method, Quantity manufacturer, country and region
- Couple's year protection cost (CYP) was added to the dataset as new variable for comparative purpose



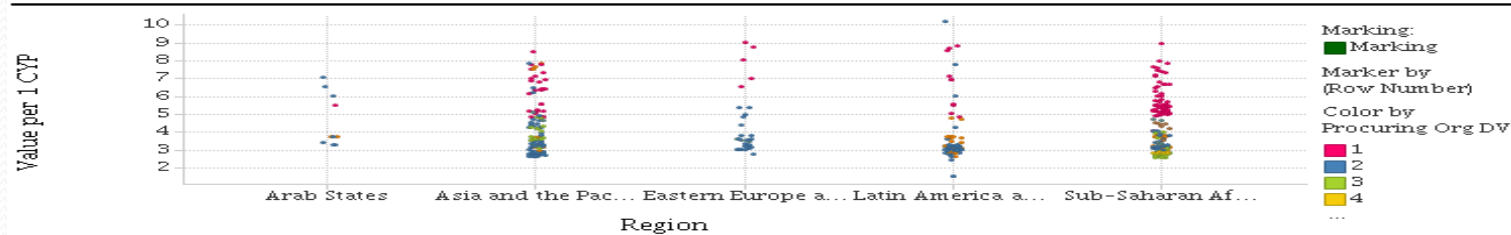


# Exploration

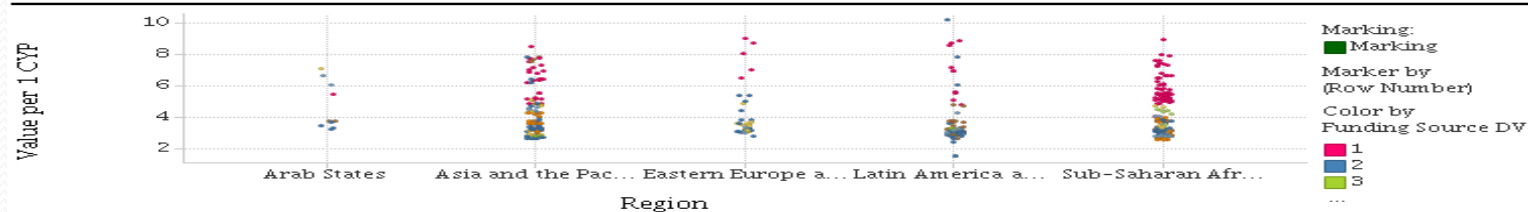
Scatter Plot



Scatter Plot



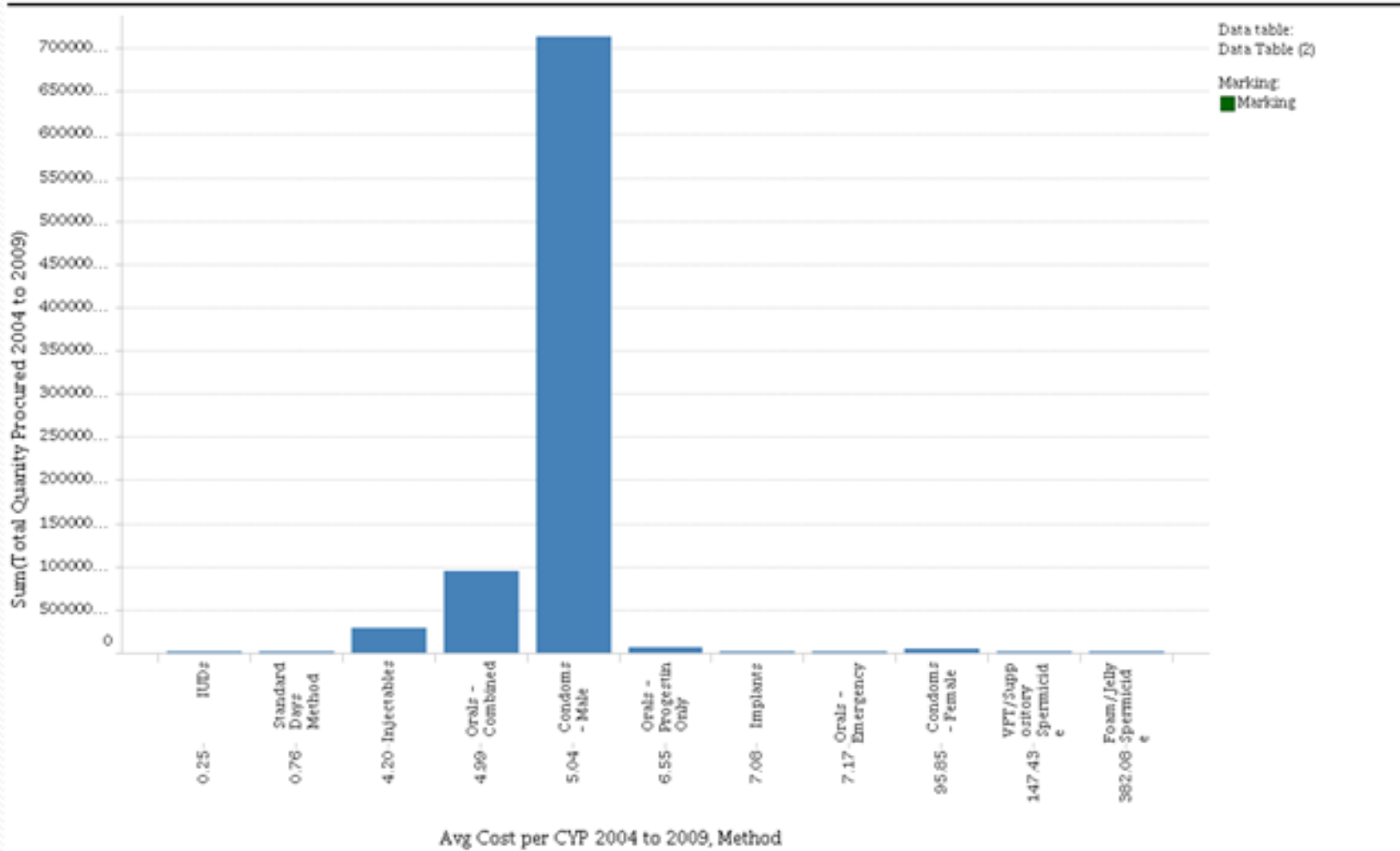
Scatter Plot





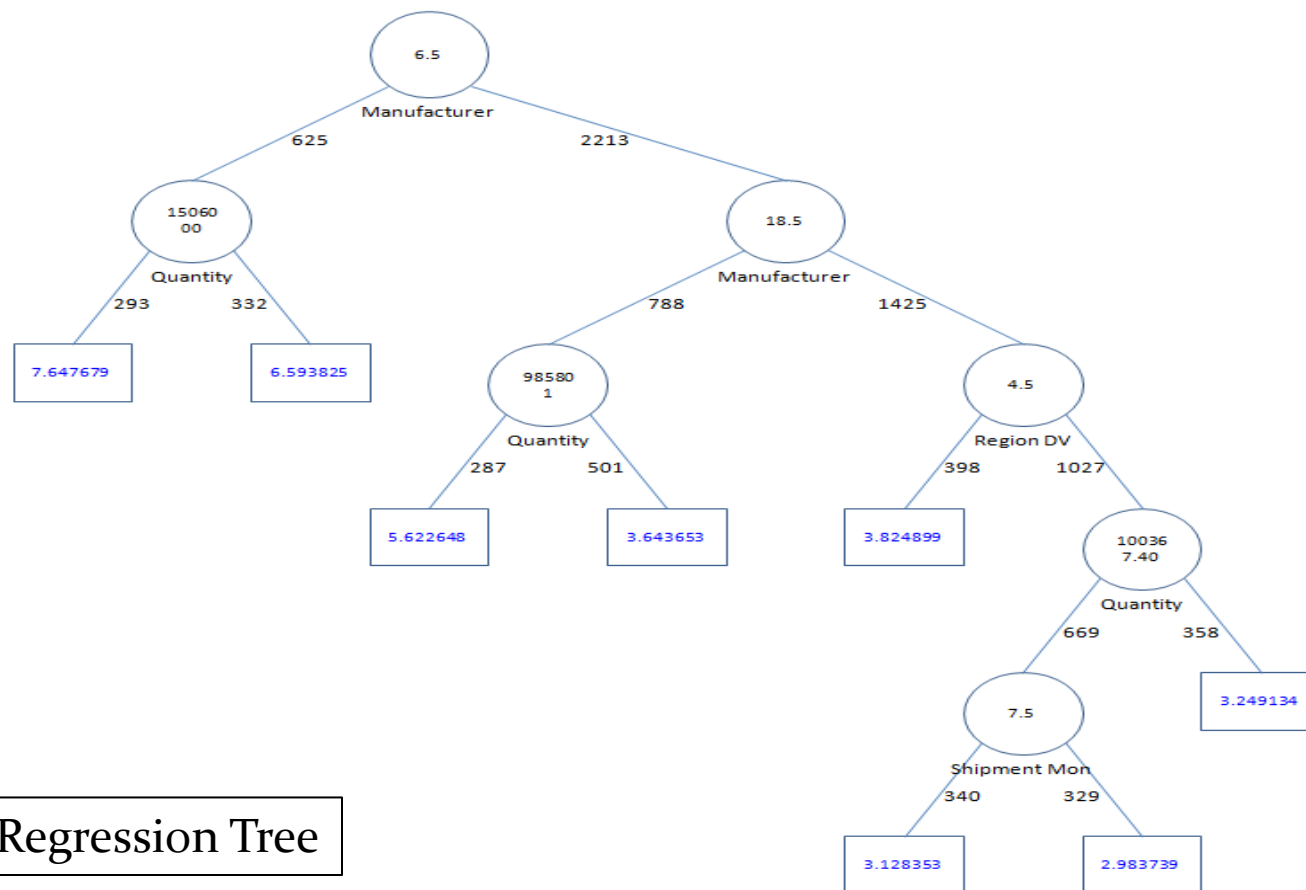
# Exploration (cont...)

Bar Chart





# Models



Regression Tree





# Results

	Shipment month	Funding Source	Procuring org	Quantity	Region	Country	Manufacturer
Male condom				X	X		X
Female condom	x		X	X			
Orals Combined			X	X			X
Oral Progestin Only			X	X			X
IUD's				X	X		X
Injectables		x				X	X
VTF	x			x	x		N/I
Standard days method							N/I
Implants				x	X	x	
Oral Emergency		x		x			x

- Table of regression tree of top three variables by method
- Quantity and Manufacturer are the most important drivers
- Depending on the method, either procurement org or region become important





# Models (Cont...)

## Linear Regression

Input variables	Coefficient	Std. Error	p-value
Constant term	-3917.0747	13987.18	0.77955782
Procuring Org Dummy 1	51436.773	16513.209	0.00194665
Procuring Org Dummy 2	41670.539	14048.379	0.00316028
Procuring Org Dummy 3	-703.66608	26071.934	0.97847903
Procuring Org Dummy 4	-41282.395	55387.488	0.45642051
Procuring Org Dummy 5	22709.664	14346.126	0.11406288
Procuring Org Dummy 7	-12147.564	36394.273	0.73868906
Method Dummy 1	-39181.559	13737.297	0.00452295
Method Dummy 2	-18897.873	28645.443	0.50974196
Method Dummy 3	1789.2343	12233.854	0.88378131
Method Dummy 4	-16422.836	14073.981	0.24381411
Method Dummy 5	-120676.63	23404.4	0.00000036
Method Dummy 6	15709.615	14343.084	0.27392793
Method Dummy 7	33452.406	14388.963	0.02048185
Quantity	0.0164081	0.0011172	0
Manufacturer Dummy 1	-12050.914	18510.951	0.51533806
Manufacturer Dummy 2	-19688.107	14995.429	0.18981008
Manufacturer Dummy 3	-43624.598	19420.588	0.02512361
Manufacturer Dummy 4	-23020.064	11532.341	0.0464659
Manufacturer Dummy 6	27102.654	21252.627	0.20281371
Manufacturer Dummy 7	151668.61	21005.027	0
Manufacturer Dummy 8	-22950.738	20008.01	0.25190258
Manufacturer Dummy 9	-19535.984	29698.635	0.51096702
Manufacturer Dummy 10	-30387.385	18290.092	0.09726255
Manufacturer Dummy 11	-20869.816	44728.723	0.64100063
Manufacturer Dummy 12	-51361.125	75033.055	0.49397081
Manufacturer Dummy 13	405317.38	35649.164	0
Manufacturer Dummy 14	-53591.832	29851.516	0.07321771
Manufacturer Dummy 15	9252.8682	44363.102	0.83486855
Manufacturer Dummy 16	662.60791	31137.297	0.98303068
Manufacturer Dummy 17	-33838.563	24450.006	0.16698396

Residual df	1385
Multiple R-squared	0.299261521
Std. Dev. estimate	104170.0703
Residual SS	1.50292E+13



Total sum of squared errors	RMS Error	Average Error
1.503E+13	103023.48	0.0015415



# Recommendations

- Differ procurement strategy depending on the method
- Maximize quantity procured
- Select most cost effective manufacturer
- Depending on method focus either on region or on procurement organization

Method	Manufacturer
Male Condom	UNITED MED-HEALTH INTERNATIONAL CORP
	MERCATOR HEALTHCARE LIMITED
	Ansell/Suretex Limited
Female Condom	THE FEMALE HEALTH CO UK PLC
	UNFPA
Oral - Combined	Famy Care Ltd
	WYETH
	Bayer Corp
Oral - Progestin	WYETH
	N V ORGANON
	Bayer
Oral - Emergency	MEDIMPEX UK LTD
	Famy Care Ltd
	Gedeon Richter
IUD	SMB Corporation of India
	Contech Devices
	Pregna International
Injectables	UNFPA
	Pfizer
	N V ORGANON
VFT / Spermicide	INNOTECH INTERNATIONAL
	Eisai Co., Ltd.
	UNFPA
Implants	UNFPA
	Schering
	Bayer Corp





# Questions

