



Zambia's input subsidy programs

Nicole M. Mason (MSU/IAPRI), T.S. Jayne (MSU),
& Rhoda Mofya-Mukuka (IAPRI)

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Input Subsidy Programs in Sub-Saharan Africa:
Methods, Findings, and Implications for Policy

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Introduction

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- **Renaissance of input subsidies in Zambia over last 15 years**
 - 1997/98: 15,000 MT
 - 2012/13: 184,000 MT (> 12x larger)
- **Massive government spending**
 - 2011: US\$184 million (0.8% of GDP)
 - 2004-2011: 30% of total ag sector & 47% of Poverty Reduction Program (PRP) spending
- Numerous studies on targeting/impacts but knowledge gaps remain

Objectives

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1. Review design & implementation – SAP to date
 2. Synthesize existing & present new empirical evidence on targeting & impacts
 3. Policy implications
 4. Remaining knowledge gaps
- Done in context of:
 - Increasing **land constraints**
 - Persistently **high rural poverty** (~80% since 1996)
 - Farmer Input Support Programme (FISP) as major PRP but **inputs go disproportionately to better-off HHs**

Data

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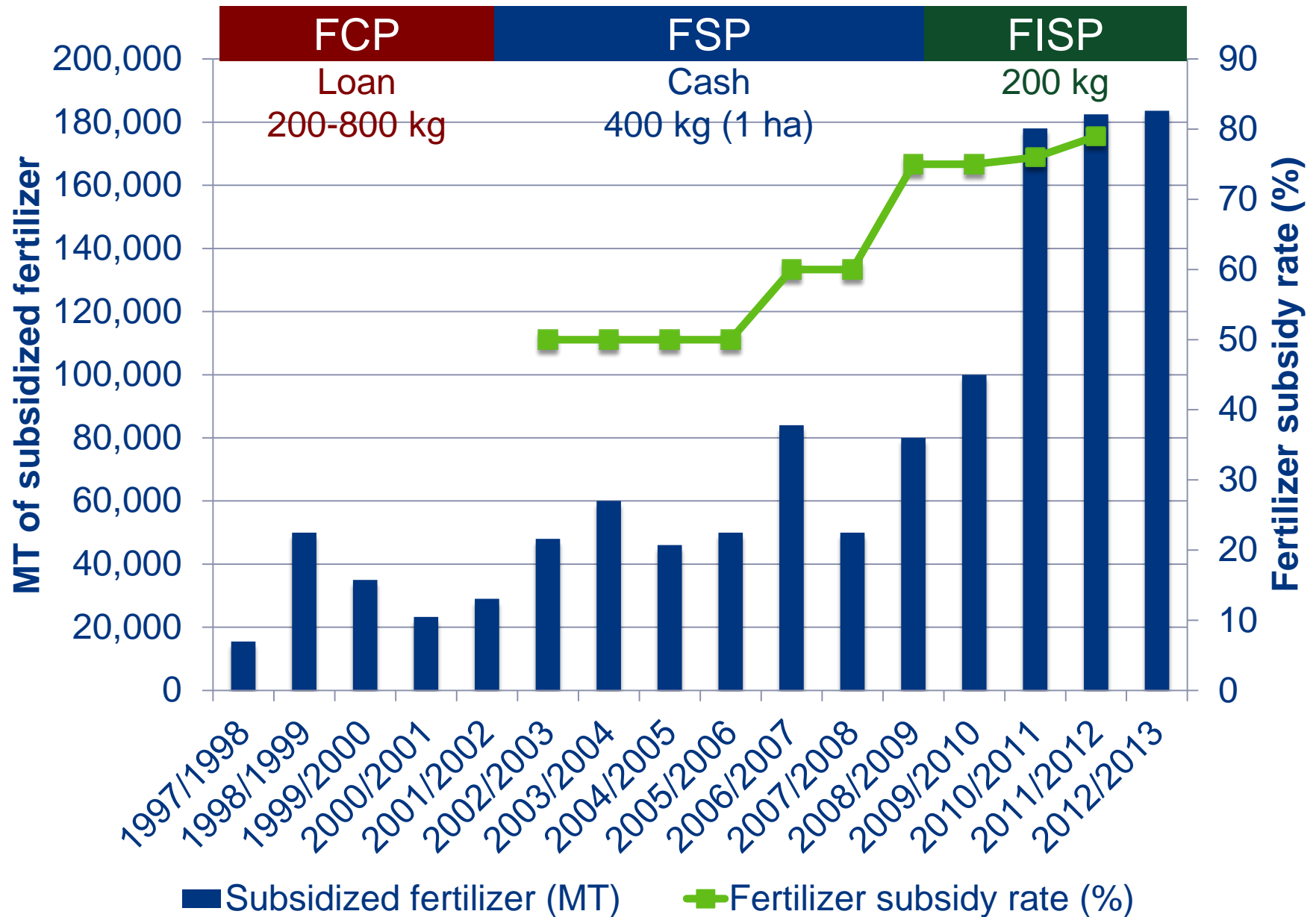
- Administrative data – Ministry of Ag. & Livestock
- Nationally-representative HH survey data
 - Crop Forecast Surveys & Post-Harvest Surveys
 - Annual. 13,500+ HHs.
 - Supplemental Survey
 - 1999/2000, 2002/2003, & 2006/2007
 - 4,286 HHs in balanced panel
 - Rural Agricultural Livelihoods Survey
 - 2010/11
 - 8,839 HHs

GRZ input subsidy programs

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1. 97/98-01/02: Fertilizer Credit Programme (FCP)
2. 02/03-08/09: Fertilizer Support Programme (FSP)
3. 09/10-present: Farmer Input Support Programme (FISP)
4. 00/01-present: Food Security Pack Programme

GRZ input subsidy programs (cont'd)



Program objectives (FSP & FISP)

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- “Improving household and national food security, incomes, [and] accessibility to agricultural inputs by small-scale farmers through a subsidy and building the capacity of the private sector to participate in the supply of agricultural inputs” (MACO, 2008)
- **Poverty reduction** implicit goal (47% of PRP)

Targeting criteria

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- **Vague!**
- Capacity to **cultivate certain area of maize** (e.g., 1-5 ha under FSP)
- **Ability to pay** back loan or pay farmer share
- **Cooperative membership**
- Not defaulter under FCP
- Not receiving Food Security Pack

Subsidized fertilizer targeting – econometric results

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HH/community characteristic	Supplemental Survey 99/00, 02/03, 06/07 (panel - CRE Tobit)	Rural Agricultural Livelihoods Survey 10/11 (X-section - Tobit)
Landholding	+	+
Farm equipment	Not. stat. sig.	+
Livestock	+	+
Distance to roads/towns	-	-
Female-headed	Not stat. sig.	+
Const. won by ruling party	+	+

Note: $p < 0.05$ unless otherwise noted. Sources: Mason et al. (2013); own calculations

FISP fertilizer receipt by area cultivated category (2010/11)

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Area cultivated (ha)	% of total HHs	% receiving FISP fertilizer	Mean kg per beneficiary HH	% of total FISP fertilizer	% of total HHs below \$1.25/day poverty line			
0-0.49	72.5	17.0	7.2	161	45.2	2.5	77.8	17.7
0.5-0.99		23.6	22.5	190		13.0		26.0
1-1.99		31.9	32.1	225		29.7		34.1
2-4.99		23.5	47.2	286		41.0		20.5
5-9.99		3.3	54.5	458		10.7		1.7
10-20		0.6	50.0	766		3.2		0.1
All HHs		100	30.0	259		100		100

Better to target larger farms because they produce more maize per kg? **No!**

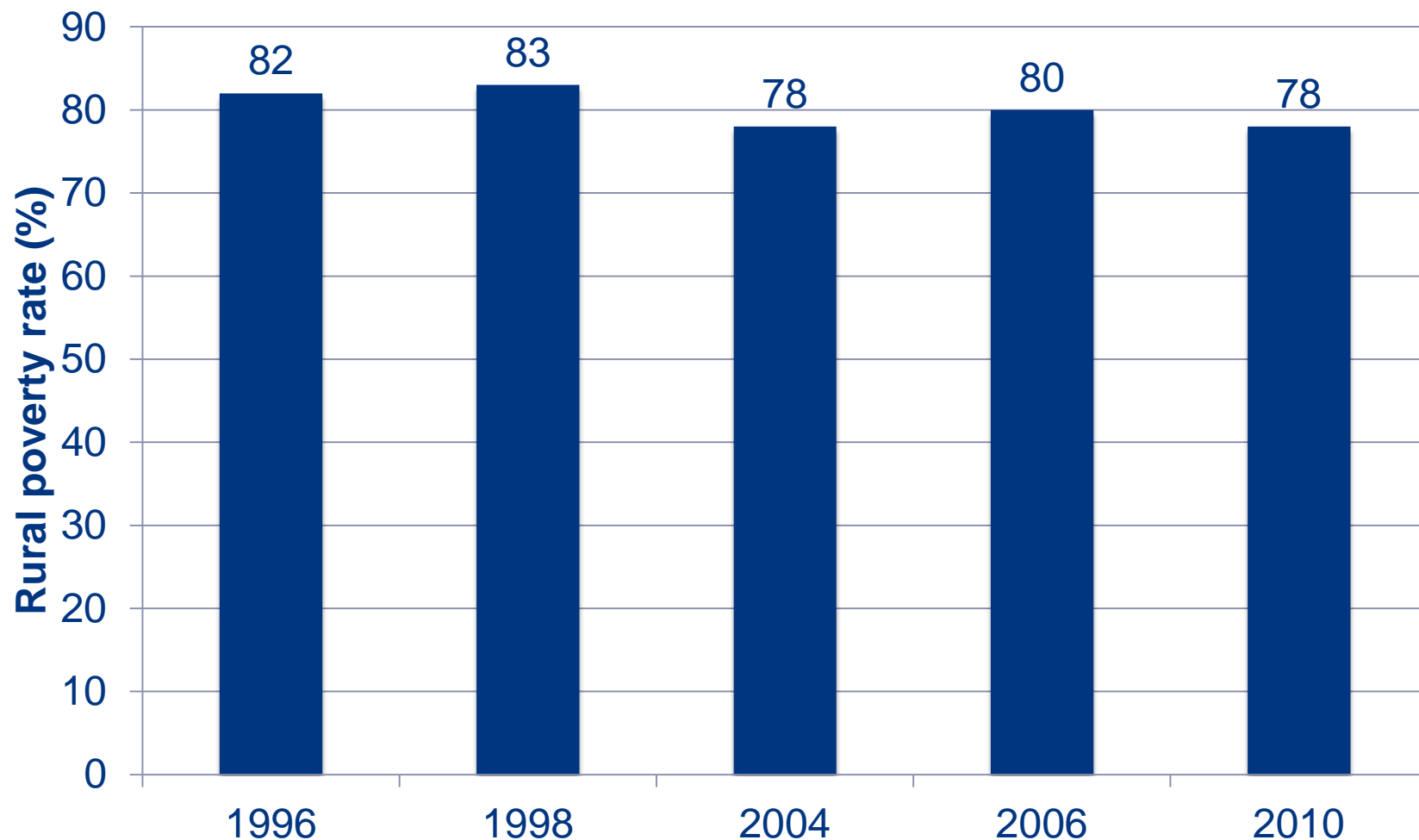
Farm size (ha)	AP of fertilizer (kg/kg)
0-0.99	3.73
1-1.99	3.48
2-4.99	3.52
5-9.99	3.68
10-20	3.46

Also **little effect on equilibrium maize prices: doubling MT/district**
→ retail price ↓ by **< 2%**



Rural poverty rates, Zambia: 1996 - 2010

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Fertilizer subsidy impacts on smallholder behavior



Econometric estimates of fertilizer subsidy effects on fertilizer use & crop production

Outcome variable	Average elasticity of outcome variable w.r.t. subsidized fertilizer	
	All HHs	Recipient HHs
Fertilizer application rate	0.11	0.30
Maize area	0.03	0.22
Maize yield	0.02	0.14
Maize output	0.05	0.37
Other crops area	Not stat. sig.	
Area under fallow	-0.02	-0.22

Note: $p < 0.05$ for all average elasticities unless otherwise noted.

- Positive effects on **maize production** but relatively **small** (1.88 kg/kg)

Why such low maize – subsidized fertilizer response rate?

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- 1. Crowding out (displacement):** 1 kg \rightarrow 0.87 kg
(Mason & Jayne, 2013)
- 2. Late delivery** (Xu et al., 2009)
 - to 20-30% of beneficiaries
 - Late delivery **halves** AP & MP of N
- 3. High soil acidity** (Burke et al., 2012b)
 - > 90%+ of maize fields have pH < 5.5
 - Fertilizer response rates **1/3** to **1/2** of those on less acidic soils (pH \geq 5.5)

Conclusions & policy implications

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1. Persistently high rural poverty despite massive spending on input subsidies
 - Fertilizer going disproportionately to better-off HHs, limited impact on poverty
 - Need to improve FISP's targeting of the poor (e.g., 0.5-2 ha)
 - Scale up Food Security Pack to target <0.5 ha
 - AP of fertilizer similar across farm sizes
→ targeting smaller farms shouldn't jeopardize national food production (Burke et al., 2012a)

Conclusions & policy implications

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2. Not getting much “bang for the buck”

(Burke et al., 2012a,b)

- Crowding out, late delivery, and soil acidity reduce maize-subsidized fertilizer response rates
 - Better targeting to reduce crowding out
 - E-voucher to crowd in private sector, potentially improve timeliness of delivery
 - Incorporate lime, other complementary technologies/management practices
 - Need intensification to reduce pressure on fallow land
 - Open up e-voucher to other crops, livestock, fish

Conclusions & policy implications

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Voters strongly reward incumbent for reductions in poverty, inequality, and unemployment ... not for FISP as currently designed & implemented (Mason et al., 2013).

3. Modifying input subsidy programs to **increase impacts on poverty, inequality, and unemployment = good politics!**
4. **FISP \geq 30% of ag sector spending.**
Shifting some funds to **investments that \downarrow poverty, inequality, and/or unemployment = good politics!** (e.g., roads, irrigation, electrification, ag R&D, improved extension, health, education, etc.)

Remaining knowledge gaps – effects on:

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1. Other aspects of smallholder behavior
 - Crop diversification, commercialization, livestock, CF, etc.
2. Climate change adaption & mitigation
3. Incomes, poverty, inequality – subsidized fertilizer (underway at IAPRI; Smale & Mason – seed)
4. Health & nutrition
5. Relative performance of “traditional” vs. e-voucher FISP
6. Supply side
7. Equilibrium prices – fertilizer, ag wages
8. Rates of return to FISP vs. other investments

Thank you for your attention! Questions?

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Nicole M. Mason
masonn@msu.edu

IAPRI
[http://www.iapri.org.zm/
index.php](http://www.iapri.org.zm/index.php)

Food Security
Research Project
[http://fsg.afre.msu.edu/
zambia/index.htm](http://fsg.afre.msu.edu/zambia/index.htm)



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FISP barriers to entry

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1. Capacity to cultivate 1+ ha of maize → immediately excludes 41% of HHs
2. Cooperative membership + cooperative share
3. Farmer share of input costs (now 20%, orig. 50%)

→ 2 + 3 = 20% of gross income for 60% of HHs

- 2006/07: 50% of non-recipients cite not a cooperative member or could not afford farmer contribution

Other studies on Zambia's input subsidies

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- **Crowding out**
 - **Fertilizer** (Xu et al., 2009b; Mason & Jayne, 2013)
 - **Seed** (Mason & Ricker-Gilbert, 2013)
- **Seed subsidy effects on incomes, poverty, & inequality** (Smale & Mason, this issue)
- **Retail maize price effects** (Ricker-Gilbert et al., this issue)
- **Political economy: links w/ election outcomes** (Mason et al., 2013)