

An empirical model of access to health care, health
care expenditure and impoverishment in Kenya:
learning from past reforms and lessons for the future

by

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1. Introduction

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1.1 Health financing history

- 1965-1989: health care primarily funded via General Tax Revenue
- 1989: severe government budget constraints → user fees for outpatient and inpatient care at government health facilities
 - Exemptions for children < 5
- 1990: widespread protest →
 - Removal of OP registration fees
 - Several studies pointed at negative impact of user fees on utilization of health care: E.g. in Kisumu and Embu OP attendance dropped by about 50%, and rose again by 41% after the removal of registration fees
- Reintroduction of 'treatment' fees in 1992, but linked to effectively available treatment, and with better exemption rules →
 - Reduction in outpatient care at hospitals dropped by 6%

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1.2 The pressing policy issue

- User fee system has continued
- However, in June 2004 → Free health care at dispensary and health centre level for all citizens, except for a minimal user fee

Still, the main issue is

health expenditure per capita = 19\$ of which 45% out-of-pocket

- Recognition that this may represent a high cost for patients and may be a leading cause of poverty
- Which options does a low-income country have to counter the burden of household payments ?

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1.3 Social health insurance as a possible mechanism

- May 2002: Intersectoral Task Force prepares strategy and legislation
- Early 2004: Interest from Government of Kenya in the introduction of a social health insurance system
- December 2004: Basic parliamentary approval but subsequent amendments from the President
- HOW to implement ?
 - The National Hospital Insurance Fund (NHIF) would be transformed into a National Social Health Insurance Fund
 - Covering all Kenyans
 - Introducing a comprehensive benefit package

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2. Purpose of the Study

- Baseline analysis of pre-social health insurance reform
 - membership of NHIF and other health insurance
 - access to health care
 - distribution of health out-of-pocket payments and catastrophic health expenditure
 - poverty impact of health out-of-pocket payments
- Evidence and directions for the health insurance design
 - population coverage
 - benefit package and co-payment

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3. The model and its determinants

Data: Kenya Health Expenditure and Utilization Survey, 2003

Methods: OLS and logit regression

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Determinants of h. i. membership, utilization of health care and out-of-pocket expenditure

| Variables | Proxy from survey | Expected coefficient: | | | |
|---------------------|--------------------------------|-----------------------|----------|---------|---------|
| | | Model 1a | Model 1b | Model 2 | Model 3 |
| Income | Quintiles (base = quintile 1) | + | + | + | + |
| Gender | Male | + | + | +/- | +/- |
| Severity of disease | Chronic health condition | + | + | + | + |
| Health insurance | Private health insurance | NA | NA | + | - |
| | Public health insurance (NHIF) | NA | NA | + | - |
| Age | Age < 5 | - | - | + | - |
| | Age > 65 | NA | - | - | + |
| Employment | Working (head) | + | + | + | NA |
| Education | Education (head) | + | + | + | - |
| Physical access | Urban | + | + | + | + |
| | Provinces (base= Nairobi) | - | - | - | - |
| Facility ownership | Public health facility | NA | NA | NA | +/- |
| | Private health facility | NA | NA | NA | + |

Notes:

NA means 'not applicable'

Model 1: Probability (health insurance membership) = $\alpha + \beta X$

...where model 1a refers to NHIF membership and model 1b to all other health insurance membership

Model 2: Probability (visit > 0 | illness) =

$\alpha + \beta X$

Model 3: Log (out-of-pocket expenditure | utilisation) = $\alpha + \beta X$

Determinants of catastrophic expenditure

| Variables | hypothesis | variables | hypothesis |
|------------------------------|------------|-------------------------------|------------|
| Utilization | | Illness | |
| outpatient service (public) | + | with members reported illness | + |
| outpatient service (private) | + | Province | ? |
| inpatient service (public) | + | Other variables | |
| inpatient service (private) | ++ | urban | - |
| Income | | currently working | - |
| 2nd quintile | - | secondary school & above | - |
| 3rd quintile | - | with members under 5 yrs | - |
| 4th quintile | - | With member above 65yrs | ? |
| 5th quintile | - | covered by insurance | -- |

4. THE RESULTS

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4.1 Key Indicators

| | % of non-poor households | % of poor households | % of total households |
|--|--------------------------|----------------------|-----------------------|
| <i>Outpatient service</i> | | | |
| reporting illness | 16.6% | 16.1% | 16.5% |
| not use | 21.4% | 33.0% | 24.9% |
| use part | 5.3% | 6.7% | 5.8% |
| use all | 73.3% | 60.2% | 69.3% |
| <i>Inpatient service</i> | | | |
| Required | 2.8% | 1.9% | 2.6% |
| not use | 21.7% | 34.5% | 24.7% |
| <i>Could not afford</i> | 32.8% | 51.9% | 40.5% |
| <i>Households with catastrophic expenditure</i> | 2.7% | 7.7% | 4.1% |
| <i>Households impoverished</i> | | | 1.5% |
| <i>Poverty gap difference (shillings) per year</i> | | | 336 |
| <i>Overall health insurance coverage (various)</i> | 12.1% | 2.6% | 9.1% |

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4.2 Membership: key positive effects

NHIF membership

- Income and working status
- Urban dwellers
- Education

Other health insurance

- Income although lower effects than for NHIF membership
- Chronic conditions
- Living in Nairobi

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Probability of health insurance membership

| Variables | NHIF | | | | | Other health insurance | | | | |
|--------------------------|--------|-------|-------|-------|--------|------------------------|-------|-------|-------|--------|
| | Coeff. | OR | S.E. | P> z | dy/dx | Coeff. | OR | S.E. | P> z | dy/dx |
| Quintile 2 | 0.485 | 1.624 | 0.163 | 0.000 | 2.19% | | | | | |
| Quintile 3 | 0.818 | 2.266 | 0.220 | 0.000 | 4.14% | 0.432 | 1.541 | 0.317 | 0.036 | 0.21% |
| Quintile 4 | 1.590 | 4.902 | 0.457 | 0.000 | 10.59% | 0.421 | 1.524 | 0.299 | 0.032 | 0.20% |
| Quintile 5 | 1.848 | 6.348 | 0.600 | 0.000 | 13.47% | 1.594 | 4.923 | 0.846 | 0.000 | 1.23% |
| Male | | | | | | 0.129 | 1.137 | 0.097 | 0.133 | 0.05% |
| Chronic health condition | | | | | | 0.318 | 1.374 | 0.235 | 0.063 | 0.15% |
| Age < 5 | -0.127 | 0.881 | 0.057 | 0.052 | -0.48% | | | | | |
| Age > 65 | | | NA | | | | | | | |
| Working (head) | 1.416 | 4.119 | 0.192 | 0.000 | 8.02% | 0.706 | 2.026 | 0.245 | 0.000 | 0.27% |
| Education (head) | 0.569 | 1.767 | 0.097 | 0.000 | 2.12% | 1.294 | 3.647 | 0.417 | 0.000 | 0.79% |
| Urban | 0.140 | 1.150 | 0.062 | 0.009 | 0.57% | | | | | |
| Central | 0.381 | 1.463 | 0.136 | 0.000 | 1.73% | -1.870 | 0.154 | 0.028 | 0.000 | -0.45% |
| Coast | 0.443 | 1.557 | 0.138 | 0.000 | 2.07% | -1.305 | 0.271 | 0.040 | 0.000 | -0.36% |
| Eastern | 0.949 | 2.582 | 0.246 | 0.000 | 5.24% | -1.514 | 0.220 | 0.044 | 0.000 | -0.41% |
| North Eastern | -0.698 | 0.498 | 0.090 | 0.000 | -2.15% | -4.349 | 0.013 | 0.013 | 0.000 | -0.60% |
| Nyanza | 1.350 | 3.857 | 0.325 | 0.000 | 8.72% | -1.571 | 0.208 | 0.036 | 0.000 | -0.41% |
| Rift Valley | 1.110 | 3.034 | 0.248 | 0.000 | 6.31% | -2.012 | 0.134 | 0.022 | 0.000 | -0.52% |
| Western | 0.726 | 2.067 | 0.183 | 0.000 | 3.70% | -1.901 | 0.149 | 0.030 | 0.000 | -0.47% |
| Number of observations | | | | | 38009 | | | | | 38009 |
| Chi value | | | | | 3598 | | | | | 1679 |
| Prob > Chi value | | | | | 0.000 | | | | | 0.000 |
| Correctly classified | | | | | 92.5% | | | | | 98.4% |

NA: not applicable

-----: not statistically significant at 0.2 level.

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4.3 Utilisation given need: key determinants

- **Applicable to both OP and IP care**
 - Positive income effects (although smaller for IP care)
 - Positive effect of education
 - Health insurance (NHIF and 'other' insurance): not statistically significant
- **OP care**
 - Children < 5 years and females have greater access
- **IP care**
 - Patients > 65 years and with chronic conditions have worse access

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Probability of using health care, given need

| Variables | Outpatient care | | | | | Inpatient care | | | | |
|--------------------------------|-----------------|-------|-------|-------|---------|----------------|-------|-------|-------|---------|
| | Coeff. | OR | S.E. | P> z | dy/dx | Coeff. | OR | S.E. | P> z | dy/dx |
| Quintile 2 | 0.2551 | 1.291 | 0.114 | 0.004 | 3.91% | 0.357 | 1.430 | 0.350 | 0.144 | 5.23% |
| Quintile 3 | 0.3682 | 1.445 | 0.134 | 0.000 | 5.52% | 0.475 | 1.609 | 0.387 | 0.048 | 6.88% |
| Quintile 4 | 0.6233 | 1.865 | 0.192 | 0.000 | 8.86% | 0.397 | 1.487 | 0.375 | 0.116 | 5.79% |
| Quintile 5 | 1.0574 | 2.879 | 0.345 | 0.000 | 13.71% | 0.916 | 2.500 | 0.741 | 0.002 | 12.27% |
| Male | -0.1498 | 0.861 | 0.054 | 0.017 | -2.41% | | | | | |
| Chronic health condition | | | | | | -0.543 | 0.581 | 0.106 | 0.003 | -9.31% |
| Private health insurance | -0.2253 | 0.798 | 0.219 | 0.411 | -3.85% | 1.165 | 3.207 | 3.443 | 0.278 | 12.68% |
| Public health insurance (NHIF) | | | NA | | | 0.441 | 1.554 | 0.507 | 0.177 | 6.18% |
| Age < 5 | 0.5718 | 1.771 | 0.146 | 0.000 | 8.32% | | | | | |
| Age > 65 | -0.4048 | 0.667 | 0.081 | 0.001 | -7.18% | -0.489 | 0.613 | 0.170 | 0.078 | -8.66% |
| Working (head) | | | | | | | | | | |
| Education (head) | 0.2262 | 1.254 | 0.104 | 0.006 | 3.51% | 0.492 | 1.635 | 0.328 | 0.014 | 7.27% |
| Urban | | | | | | | | | | |
| Central | -0.4686 | 0.626 | 0.085 | 0.001 | -8.31% | -0.942 | 0.390 | 0.124 | 0.003 | -17.77% |
| Coast | -0.8933 | 0.409 | 0.053 | 0.000 | -17.14% | | | | | |
| Eastern | | | | | | -0.540 | 0.583 | 0.204 | 0.122 | -9.55% |
| North Eastern | -2.7111 | 0.066 | 0.009 | 0.000 | -58.66% | -1.680 | 0.186 | 0.086 | 0.000 | -36.58% |
| Nyanza | -1.1517 | 0.316 | 0.034 | 0.000 | -22.03% | -1.191 | 0.304 | 0.086 | 0.000 | -21.82% |
| Rift Valley | -0.5707 | 0.565 | 0.070 | 0.000 | -10.21% | -0.472 | 0.624 | 0.200 | 0.142 | -8.13% |
| Western | -1.3289 | 0.265 | 0.031 | 0.000 | -26.80% | -0.912 | 0.402 | 0.133 | 0.006 | -17.29% |
| Number of observations | | | | | 6615 | | | | | 1049 |
| Chi value | | | | | 775.17 | | | | | 93.37 |
| Prob > Chi value | | | | | 0.000 | | | | | 0.000 |
| Correctly classified | | | | | 79.2% | | | | | 78.5% |

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4.4 Out-of-pocket payments given utilisation: key determinants

Factors that increase OOP

- Income (yet smaller for OP care)
- Patients > 65 years pay more
- Visiting private health facilities

Factors that decrease OOP

- Children < 5 years and females pay less (although less evident for IP care)
- Visiting public health facilities reduces OOP for IP care
- Provinces outside Nairobi generally lower or equivalent OOP
 - North Eastern Province has higher OOP

Health insurance: no statistically significant effect

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Out-of-pocket health expenditure given utilization

| Variables | Outpatient care | | | Inpatient care | | |
|--------------------------------|-----------------|-------|-------|----------------|-------|-------|
| | Coeff. | S.E. | P> t | Coeff. | S.E. | P> t |
| Quintile 2 | 0.272 | 0.068 | 0.000 | 0.696 | 0.252 | 0.006 |
| Quintile 3 | 0.532 | 0.070 | 0.000 | 0.896 | 0.248 | 0.000 |
| Quintile 4 | 0.708 | 0.072 | 0.000 | 1.075 | 0.255 | 0.000 |
| Quintile 5 | 1.302 | 0.077 | 0.000 | 1.852 | 0.256 | 0.000 |
| Male | 0.076 | 0.043 | 0.077 | 0.199 | 0.153 | 0.194 |
| Chronic health condition | 0.246 | 0.062 | 0.000 | ----- | | |
| Private health insurance | 0.220 | 0.165 | 0.182 | -0.313 | 1.022 | 0.760 |
| Public health insurance (NHIF) | | NA | | -0.321 | 0.276 | 0.245 |
| Age < 5 | -0.300 | 0.052 | 0.000 | -0.416 | 0.186 | 0.026 |
| Age > 65 | 0.250 | 0.099 | 0.012 | 0.591 | 0.335 | 0.079 |
| Education (head) | -0.089 | 0.051 | 0.080 | ----- | | |
| Urban | | ----- | | ----- | | |
| Central | -0.654 | 0.100 | 0.000 | ----- | | |
| Coast | -0.474 | 0.102 | 0.000 | -0.544 | 0.235 | 0.021 |
| Eastern | -0.453 | 0.101 | 0.000 | ----- | | |
| North Eastern | 0.428 | 0.152 | 0.005 | ----- | | |
| Nyanza | -0.462 | 0.096 | 0.000 | -0.312 | 0.184 | 0.090 |
| Rift Valley | -0.366 | 0.097 | 0.000 | ----- | | |
| Western | -0.636 | 0.101 | 0.000 | -0.834 | 0.230 | 0.000 |
| Public health facility | | ----- | | -0.438 | 0.220 | 0.047 |
| Private health facility | 0.357 | 0.044 | 0.000 | 0.356 | 0.273 | 0.193 |
| Constant | 4.813 | 0.106 | 0.000 | 7.361 | 0.300 | 0.000 |
| Number of observations | | | 3041 | | | 410 |
| F value | | | 40.61 | | | 8.78 |
| Prob > F value | | | 0.000 | | | 0.000 |
| R-squared | | | 0.212 | | | 0.237 |

NA: not applicable

-----: not statistically significant at 0.2 level.

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4.5 Catastrophic expenditure: key determinants

Factors that increase catastrophic expenditure

- Illness among households with members reported ill
- Use of health facilities increases catastrophic spending
 - Especially IP care at public health facilities
- Living in Eastern and North-eastern Province

Factors that decrease catastrophic expenditure

- Income
- Currently working
- Education of household head
- Living in urban area

Health insurance: no statistical significant effect observed

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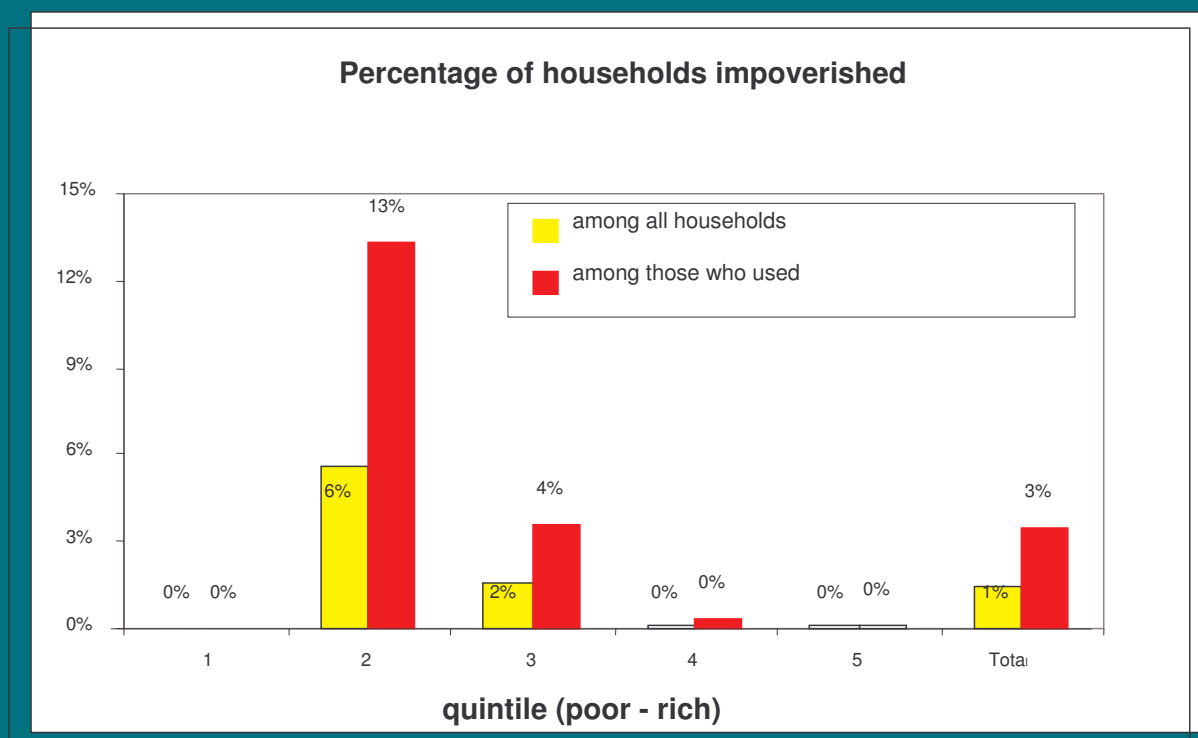
Determinants of catastrophic expenditure

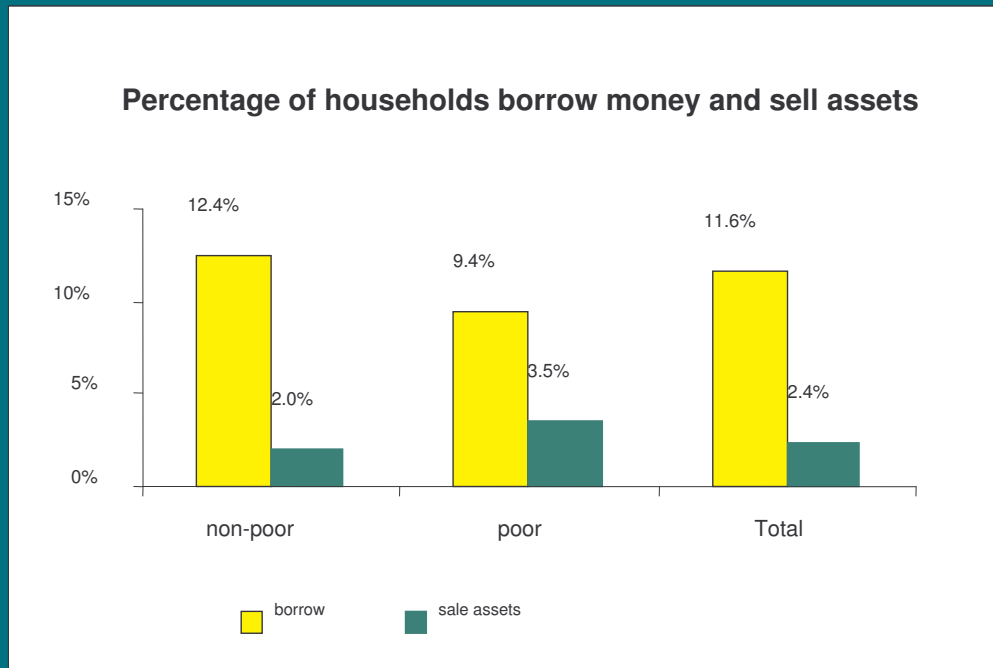
| variables | Coef. | OR | Std. Err. | z | P>z | marginal effect |
|------------------------------|-------|------|-----------|-------|------|-----------------|
| Province | | | | | | |
| Central | -0.34 | 0.71 | 0.26 | -1.33 | 0.18 | -0.49% |
| Coast | -0.40 | 0.67 | 0.31 | -1.28 | 0.20 | -0.55% |
| Eastern | 0.33 | 1.39 | 0.19 | 1.75 | 0.08 | 0.59% |
| North eastern | 0.65 | 1.91 | 0.30 | 2.14 | 0.03 | 1.42% |
| Income | | | | | | |
| 2nd quintile | -0.76 | 0.47 | 0.19 | -4.05 | 0.00 | -1.00% |
| 3rd quintile | -0.83 | 0.44 | 0.23 | -3.62 | 0.00 | -1.07% |
| 4th quintile | -1.16 | 0.31 | 0.28 | -4.07 | 0.00 | -1.39% |
| 5th quintile | -0.92 | 0.40 | 0.27 | -3.42 | 0.00 | -1.16% |
| Utilization | | | | | | |
| outpatient service (public) | 1.20 | 3.31 | 0.17 | 7.17 | 0.00 | 2.91% |
| outpatient service (private) | 1.19 | 3.27 | 0.17 | 6.81 | 0.00 | 3.02% |
| inpatient service (public) | 1.74 | 5.69 | 0.26 | 6.71 | 0.00 | 6.55% |
| inpatient service (private) | 1.22 | 3.39 | 0.49 | 2.50 | 0.01 | 3.65% |

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| Variables | Coef. | OR | Std.Err. | z | P>z | marginal effect |
|------------------------------------|-------|------|----------|--------|------|-----------------|
| Illness | | | | | | |
| with members reported illness | 1.27 | 3.56 | 0.23 | 5.46 | 0.00 | 2.08% |
| Other variables | | | | | | |
| urban | -0.98 | 0.37 | 0.31 | -3.16 | 0.00 | -1.33% |
| currently working | -0.35 | 0.71 | 0.16 | -2.20 | 0.03 | -0.59% |
| secondary school & above | -0.71 | 0.49 | 0.26 | -2.78 | 0.01 | -1.02% |
| With members under 5 yrs | -0.26 | 0.77 | 0.15 | -1.68 | 0.09 | -0.41% |
| covered by insurance | 0.04 | 1.04 | 0.32 | 0.14 | 0.89 | 0.07% |
| _cons | -3.65 | | 0.25 | -14.88 | 0.00 | |
| Number of obs = 8407 | | | | | | |
| Wald chi2(18) = 385.10 | | | | | | |
| Prob > chi2 = 0.000 | | | | | | |
| Log pseudo-likelihood = -1147.3624 | | | | | | |

4.6 Impoverishment due to health payments





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5. Key lessons for health financing reforms (1)

- Challenges for NSHIF related to [health insurance membership and access to care](#)
 - Ability among the insured to register wherever their residence is
 - Provision of basic health care package, whatever income or social status or patients
 - Attention to the aged > 65 years and patients with chronic diseases

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5. Key lessons for health financing reforms (2)

- Challenges for NSHIF related to minimizing out-of-pocket payments and impact on impoverishment
 - Adequacy of benefit package
 - Adequacy of prepayment so as reduce catastrophic payment
 - Need to avoid impoverishment: possible exemptions for co-payments

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ANNEX: Catastrophic expenditure and impoverishment

$$DG = Ga - Gb$$

where

- DG is the difference in poverty gap before and after health payments
- Ga is the poverty gap after health payments
- Gb is the poverty gap before health payments

and

$$G = 1/n \{ \sum (z - y_i) \} \quad \text{if } y_i < z$$

where

- Z = poverty line
- Y_i = income of i-th household
- n = number of households

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