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8TH ANNUAL MEETING OF THE PPR GLOBAL RESEARCH AND EXPERTISE NETWORK (PPR-GREN)

25 – 27 NOVEMBER 2025 QINGDAO, CHINA



中华人民共和国农业农村部

Ministry of Agriculture and Rural Affairs of the People's Republic of China



中国动物卫生与流行病学中心
China Animal Health and Epidemiology Center

A GF-TADS initiative for
PPR control



GF-TADS
GLOBAL FRAMEWORK FOR THE
PROGRESSIVE CONTROL OF
TRANSBOUNDARY ANIMAL DISEASES



A Systematic Review of the Socioeconomic Impact of PPR in Africa and Asia from 2006–2025

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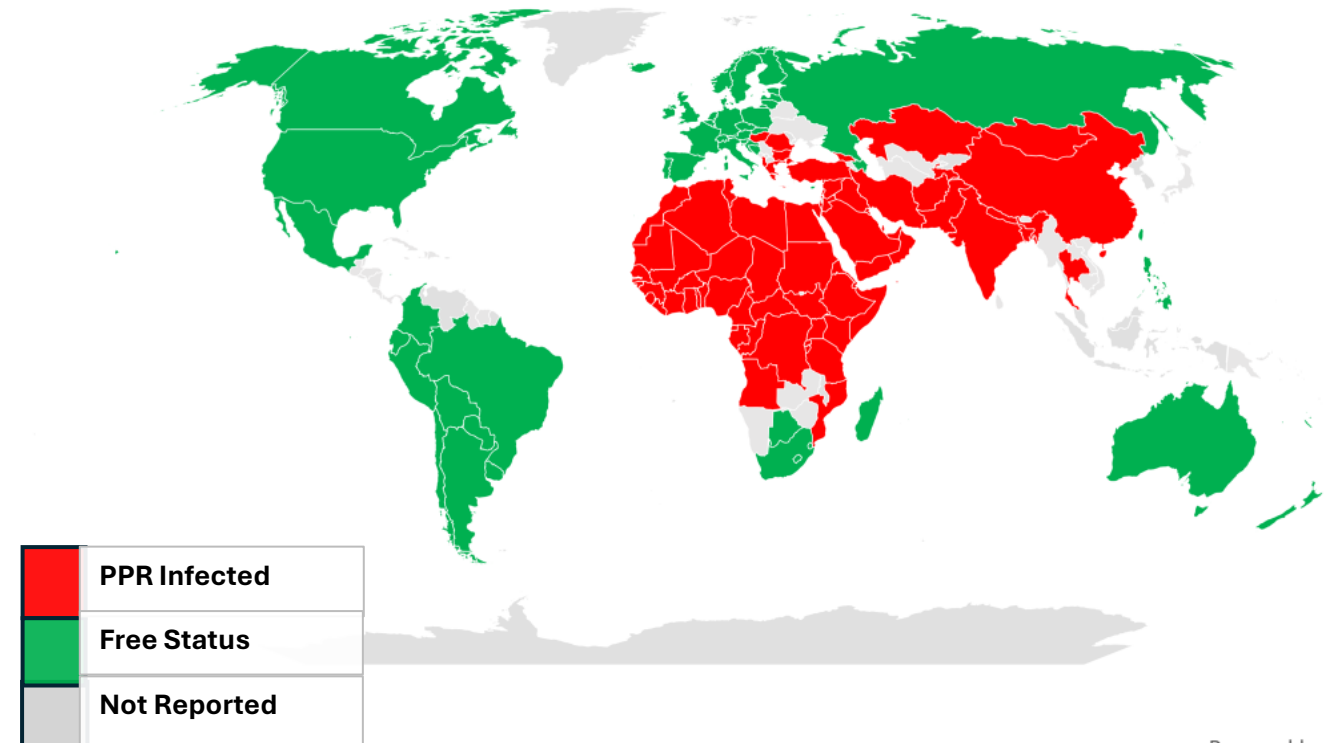
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Why this matters? (1/2)

- PPR, devastating transboundary viral disease to over **2.5 billion SRs**
- Africa, Middle East, & Asia > **70 countries are endemic**
- Critically affects the livelihoods of over **330M** poor rural families
- Impacts on **consumption choices**

PPR Global Status in 2025



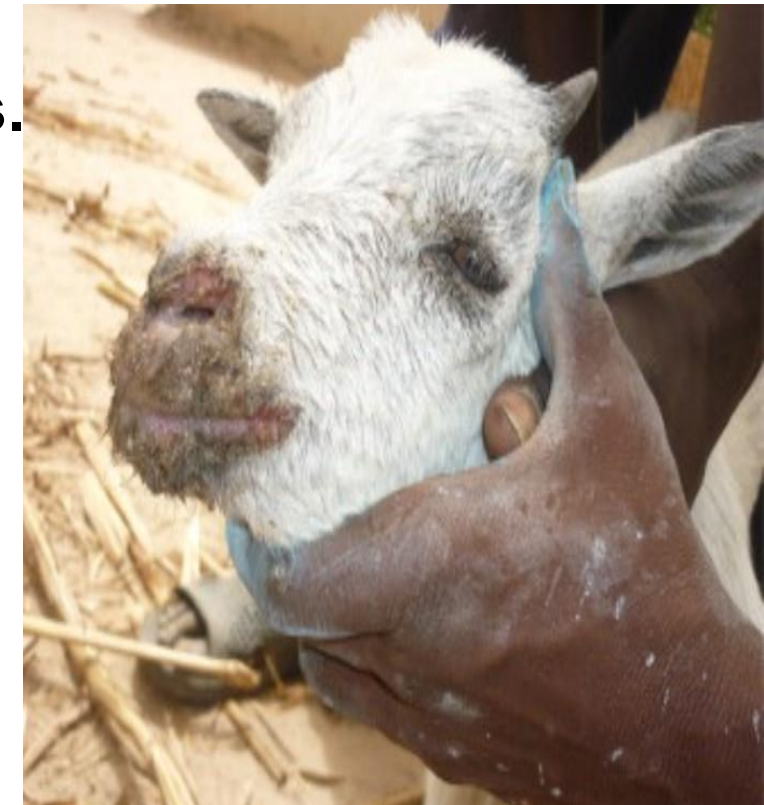
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Why this matters? (2/2)

- ❖ PPR drives recurrent welfare losses across **HH, farm level, national economies**, with spillovers into trade and food security.
- ❖ Dire impacts, FAO & OIE launch GEP-PPR (2015), [2030](#)
 - 15 Years programme (2015-2030) of global eradication of PPR predicts a **USD 74.2 billion**
 - Reduce high vaccine and control costs associated with SR diseases
 - Availability of verified effective animal live-long immunity vaccines,
- ❖ Disparities in **cost, infrastructure & delivery systems** severely undermine vaccination efforts in many endemic countries.

Objective

- ❑ **Systematically analyze published evidence from 2006 – 2025, focusing on Social, economic impacts, & vaccine cost effectiveness.**



Methodology

METHODOLOGY

Data analysis process

Inclusion criteria: data on SE , vaccine dose cost, vaccination / eradication cost, SR cost & SR pop/country, in both French and English

Exclusion criteria: data opposite to the inclusion criteria

Data collection

Systematic search, Google scholar primary search engine for peer review & grey literature 2006-2025

-Foundational primary source: PPR-GEP

-Secondary sources: country-level reports, assessments (FAO).



Imposed direct losses on nation economies

Countries	Losses in USD
Burkina Faso	552M (2014-2017); 138M/Yr
India	198M (10% PPR incidence)
Tanzania	162M/Yr
Ethiopia	64M/Yr
Senegal	25M/Yr
Kenya	15M (2006 – 2007); 19.1M (2010) mortality alone at 16.8M
Mauritania	17.2M livestock mortality
Sierra Leone	10.86M
Sudan	9.28M
Mongolia	7.27M losses (2017); 70% decline saiga antelope populations

Direct losses HH & farmer levels

Countries	HH/Farmer losses (USD)
Benin	68 Farmers lost USD 9.698 k over 2 years
Tunisia	USD 811 – 5840 / farm; weight loss in surviving SRs
Tanzania	USD 530– 850 (sheep, goats) per HH
Ethiopia	USD 300 – 329 (goats, sheep); 14% income losses per HH
India	USD 165 average HH losses; Farm loss USD 249
Sierra Leone	>200,000 SRs (2017- 2018); 89% farmer's income
Kenya	Morbidity/mortality 73–80%; steep milk & weight losses

Indirect & systemic losses

Countries	Indirect losses
Burkina Faso	USD 588K loss in manure
Niger & Sudan	Export disruptions & sanitary restrictions
Sierra Leone	45% panic sales, 60% income loss, worsened food insecurity & livelihoods (women & youth)
Kenya	Decline milk production, disproportionate impact on women's income, weight loss = ↓ in market value
Sudan	Trade restrictions , low production & forced sales at low prices & animal consumption
DRC	Disruption in value chains leading to high meat prices , disruption of livelihoods (women & youth), increased poverty & malnutrition
Tanzania	17% abortion, 6% weight loss, low production, trade disruption & market instability
Tunisia	25% weight loss in surviving animals = ↓ in market value
India	Distressed sales limiting reinvestment & recovery

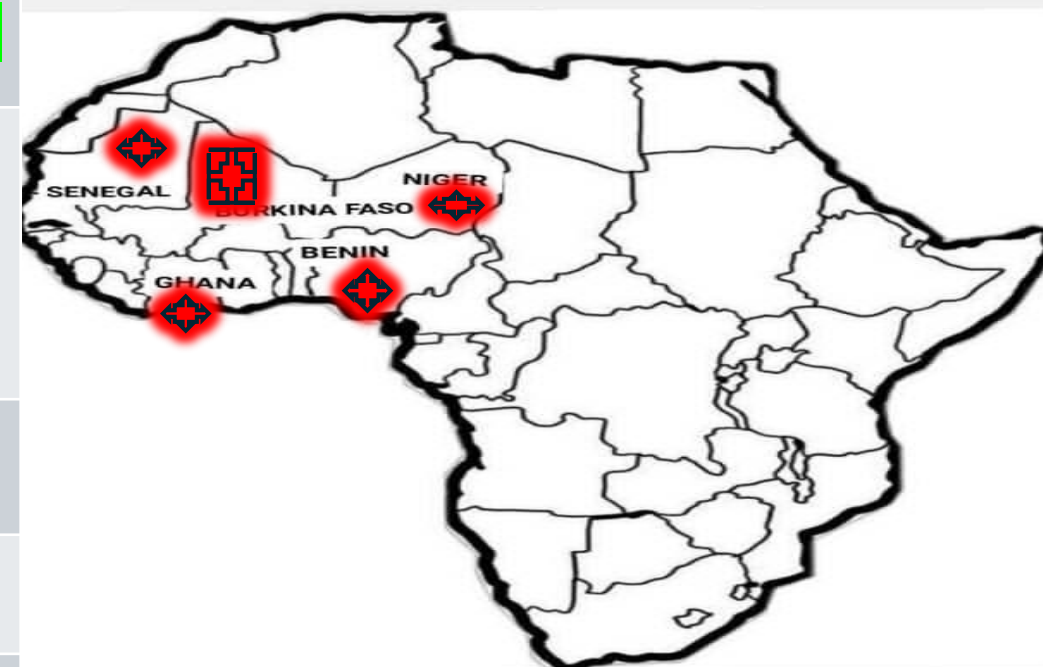


Gender and socio-cultural lens

Social impediments	Gender disparities	Low farmer awareness (PPR & vaccine)	High vaccine cost	Uncontrolled SR mobility	Political instability
Countries	Kenya	India	Sudan	India	Niger
	Senegal	Tanzania	Tanzania	Tunisia	DRC
	Ghana	Ghana	Senegal	DRC	Burkina Faso
		Burkina Faso	Niger		
		Benin			
		Mongolia (vet staff)			
Disruptions to festivals, bride-price, religious events, etc tied to SRs					

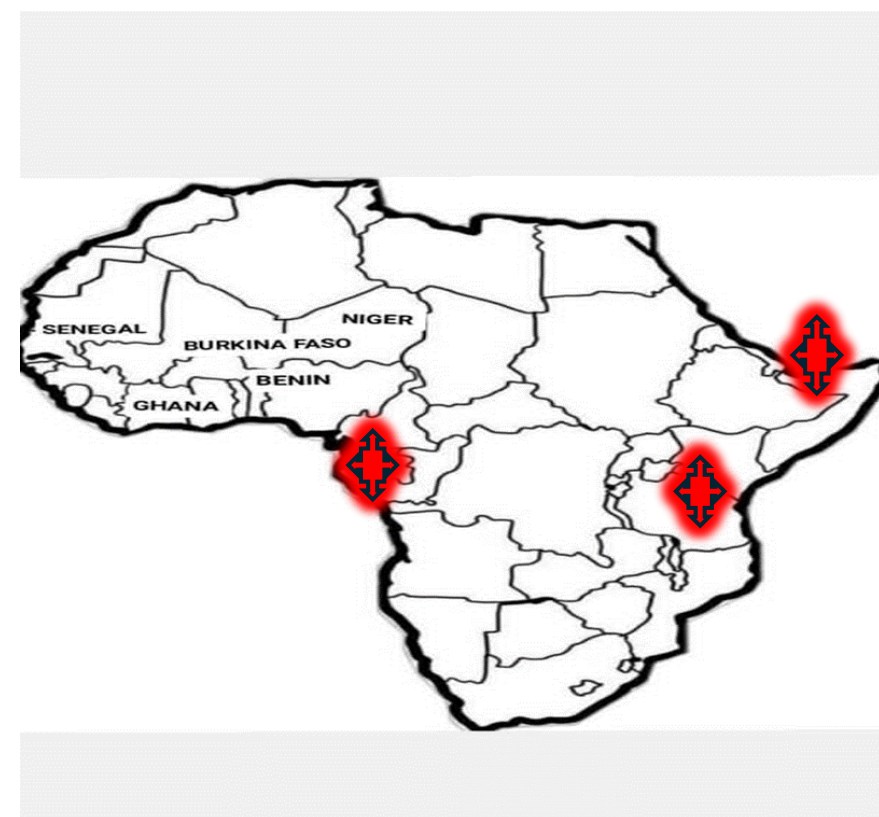
Vaccine cost per dose & SR cost (1/4)

West Africa	N° SR/country	Vaccine cost / dose in USD	Price / SR in USD
Benin	5.9M	0.21	35.67
Burkina Faso	22M	0.30 (public) & 0.18 (private)	37.81
Ghana	14.7M	0.125	40
Niger	33.9M	0.32	48.16
Senegal	14.3	0.19	251



Vaccine cost per dose & SR cost (2/4)

Central & East Africa	N° SR/country	Vaccine cost / dose in USD	Price / SR in USD
DRC	9.6M	0.10 - 0.28	52.23 – 66.16
Ethiopia	64M	0.13	13.5
Kenya	44.8M	0.38	25.75



Vaccine cost per dose & SR cost (3/4)

North & South Africa	N° SR/country	Vaccine cost / dose in USD	Price / SR in USD
Tunisia	7.7M	<u>0.77</u>	<u>40.19</u> (goats) & <u>69.89</u> (sheep)
Zambia	5.6M	0.10	10.80 – 15.12



Vaccine cost per dose & SR cost (4/4)

Asia	N° SR/country	Vaccine cost / dose in USD	Price / SR in USD
India	<u>223M</u>	<u>0.27</u>	<u>42.41</u>
Mongolia	47.4M	0.18	34.87



Exception

Country	N° SR/country	Vaccine cost/dose in USD	Price / SR in USD
Mauritania	16M	<u>251</u>	<u>251</u>

➤ bundled packaged costing approach of public mass vaccination campaigns (infrastructure, cold chain, training, vehicles, functioning laboratories, staff, field mission, & veterinary products)

Countries with only SR cost

Country	N° SR/country	Price / SR in USD
Sierra Leone	2.5M	<u>178.5</u>
Sudan	<u>70.8M</u>	<u>13.5</u>
Tanzania	24.6M	25.75

❖ Financing must account for delivery economics, not just vial price



ROI / BCR / NPV / IRR

Countries	Return On Investment	Benefit Cost Ratio	Net Present Value in USD	Internal Rate of Returns
DRC	/	1,363.94	/	/
India	/	43-57	4.3M – 21.6M	162-169
Niger	/	22.57 – 45.76	58.7m	/
Zambia	/	20.23	USD 10.6M	
Ghana	/	3.27	/	319, payback period 1Yr
Ethiopia	Vaccination will pay with outbreak 1/13 years	/	/	/
Mongolia	High control and supervision cost	↓	/	
Benin	/	↓ Calculated over 1 Yr	/	/

Why ROI differs? = structure, price & coverage

❖ Vaccine Vs delivery

- Remote areas undergo delivery & cold chain issues despite low price

❖ Coverage and targeting

- Low coverage collapses ROI even with low dose price (**17% vac Benin**)

❖ Production and system shocks

- Mobility, droughts & market access modulates benefit

❖ Inference

- High BCR where coverage is high (**India & Ghana**) & value chains integrated

Negative BCR where costs are higher & systems are thin (**Mongolia, low detection & lack of knowledge vet staff**)

Strategize grouping for investment

- **High-return, ready to scale** countries with **strong BCR** & functioning delivery:
 - **DRC: USD 1M investment = USD 94M benefit (very high local BCR under targeted strategy)**
 - **Ghana (6.5M investment = 21.1M benefit)**
 - **Niger (1M investment = 22.57M benefit)**
 - **Zambia (5yr vacc pro = 10.6M NPV)**
- **High burden countries/potential:**
 - **Ethiopia, Tanzania, Burkina Faso** (challenges in coverage/logistics)
 - **Dose cheap, ops costs & low coverage depress ROI logistics-constrained:**
 - **Benin**
 - **Negative ROI without better targeting: Mongolia**

Gaps & recommendations

Gaps	Perspectives
➤ Heterogeneous designs	▪ Harmonize data systems across regions
➤ Inconsistent dose vs delivery costs	▪ Support regionally tailored vaccination strategies & finance delivery alongside vials
➤ Limited quantified & disaggregated gender impacts analysis	▪ Integrate gender/youth responsive approaches
➤ Limited socioeconomic data & weak integration of economics in vaccination campaigns	▪ Use ROI to unlock political will & leverage big donor interest

Acknowledgements

Targeted, well-delivered vaccination yields consistently positive returns across multiple settings, often with rapid paybacks

DTRA & EC (financial support has been instrumental in realizing socioeconomic studies at country level)

Co-authors:

Drs: Govindaraj Naidu, Paul Rossiter, Satya Parida & Felix Njeumi

FAO PPR-Secretariat



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Thank you for your kind attention!

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