



# Village Adoption Programme: A Benchmark Survey Report of Damera Village

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

Benchmark survey was conducted during the year 2020 in adopted village, Damera of Agricultural College, Warangal to collect information on various aspects like socio-economic conditions of farmers, demographic profile, land holding, cropping pattern, farming system practices and constraints faced by farmers, adoption and technology gaps of new agricultural technologies/varieties. Participatory rural appraisal techniques like direct observation, social mapping, venn diagram, timeline, seasonal calendar, resource mapping and transect walk were followed with the involvement of farmers to find out the information about problems, needs and

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potentials of the village. The study report shows that, majority of the farmers belong to marginal farmers (75.20%). It was observed that farmers highly depend on local dealers for purchasing seeds. Hybrids were preferred in cotton and maize cultivation and mainly purchased from local shop dealers. Hence, demonstration on popularization of new agricultural varieties/knowledge on remunerative cropping systems and need based location specific capacity building programmes must be conducted to the farmers for improvement in their socio economic status.

*Keywords: Adopted village; baseline survey; socio-economic survey; participatory rural appraisal.*

## 1. INTRODUCTION

Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with 82 percent of farmers being small and marginal [1]. Most of the villages in the country still face constraints such as access to education, health facilities, drinking water, power, credit etc. In the agricultural sector, information on good agricultural practices, soil health status, availability of viable technologies, knowledge on crop protection measures, markets etc., are some of the constraints which directly impacts the socio-economic status of the village households [2,3]. Damera village and mandal, Hanamkonda district is adopted by Agricultural College, Warangal for a period of 3 years after having consultation with the village institutions, agricultural department and related local bodies. The village is at a distance of 18 km from the college and it is well connected by road. The process of village adoption is involvement of faculty members to drive the process of development in a selected village [4]. The main objective of the village adoption programme is to aim for holistic and integrated development of a village through capacity building, technology sharing and optimizing the use of existing resources in the areas of agriculture & allied sectors which were resulting in inclusive growth [5-8]. Baseline survey allows the researcher to understand the location specific actual problems in the study area by gathering information from the respondents [9,10]. After completing the baseline survey, one should conduct need based assessment with the collected data and information. Keeping this in view, a benchmark survey was conducted in the adopted village, Damera to understand the needs of the villagers and to know the accessibility and availability of services to them. The information collected will be utilized in disseminating the technologies introduced by Agricultural University for improving the income and livelihood of the adopted village farmers.

## 2. MATERIALS AND METHODS

The team of village adoption committee comprises of faculty representing crop production, crop protection, social sciences and horticultural sciences were involved in conducting the present study. Benchmark survey was carried out in 2020 to record benchmarks of different indicators for improving livelihoods of farmers in adopted village. As the population size is large, simple random sampling method was followed to select the respondents which reduces the bias involved in the sample. Information was collected by interviewing 120 farmers by conducting door to door survey in the village with the help of a pretested interview schedule. Apart from the survey, focused group discussions were also organized to know extensively about the village, agriculture status and socio-economic conditions of the farmers.

## 3. RESULTS AND DISCUSSION

The survey was conducted in Damera village and mandal of Hanamkonda district from 120 farmers. The analysis of the conducted study is as follows:

### 3.1 Basic Statistics of the Village

The total population of the village was 4143, in which 52.37 per cent of the population depend on agriculture. Literacy percentage was 61.00 per cent. Other agriculture and livestock related information of the adopted village is as follows (Table 1).

### 3.2 Demographic Particulars

The population of the village is 4143 with 2033 male and 2133 female population. Total number of houses were 1052. The percent in population has been increased in both males and females when compared to 2011 census (Table 2).

**Table 1. Basic statistics of Damera village**

<b>Category</b>	<b>Remarks</b>
Population dependent on agriculture	52.37 percent
<b>Literacy status</b>	
a. Literates	61.01 percent
b. Illiterates	38.99 percent
Average size of land holdings	1.2 acres
Average cultivated area	1.8 acres.
Average value of land	Rs.5,00,000
Average labour charges	Rs. 320 per day of 8 hrs.
Major soil types	Black and red soils (90:10)
Major crops	Cotton, Paddy and Maize
Adoption of inter cropping	Cotton and red gram (4:1)
Major vegetable crops	Tomato, Bhendi, Bottle gourd, Tomato, Green chilly, Brinjal, Coriander
Ornamental crops	Nil
Natural vegetation	Neem, Tamarind, Pongamia etc.
Orchard crops	Banana
<b>Livestock population</b>	
White (Cows)	20
Black (Buffaloes and Oxen)	1850
Total cattle population (W+B)	1870
Sheep	100
Goat	1500
Stray dogs	50
Backyard poultry	500
Average number of livestock	10
Average milk yield (Village)	5000 lit per day
Average price of milk	Rs.40.00
Average level of indebtedness	Rs.86,500
Average production of cotton per Household	7-8 q/ac
Average production of paddy and maize per household	15 and 20 quintals/ac
Average income from the cotton	Rs.30,000 per household
Average income from the paddy	Rs.15,000 per household
Average market price for cotton	Rs.5500 per quintal
Average market price for paddy	Rs.1800 per quintal
Farm mechanization	Tractors
Women Self Help Groups (SHG)	86 (10 members in each group)
Agriculture inputs purchase points	Damera (3) and Hanamkonda
Subsidized seeds	Hanamkonda
Agriculture credit	APGVB, Damera branch, Warangal Union Bank of India, Arepally
<b>Marketing of Agricultural Produce</b>	
Vegetables	Warangal vegetable market
Cotton	Enamamula market
Paddy	Household consumption
Maize	Enamamula market

### 3.3 Participatory Rural Appraisal (PRA)

Participatory Rural Appraisal (PRA) is a systematic, semi structured activity conducted on site by a multi-disciplinary team. It is basically a bottom to top approach of learning rural life forms with and by rural people. The technique involves

village transect, social and resource mapping, timeline, matrix ranking and Venn diagram.

- i) **Village Transect:** The main objective of the transect is to understand and study the major land uses, topographical pattern,

water resources, crops, natural vegetation, livestock and different ecological zones by observing, interacting and discussing with the key informants, while walking in the decided direction.

**ii) Social and Resource mapping:**

Resource map of Damera village gives an idea about the various resources such as crops, water sources, drinking water availability in the village. The social map of Damera village was drawn using the information that was gathered from the key informants and also from the villagers met.

**iii) Timeline on the crops grown in the village:**

Information about the crops grown earlier and now was collected from aged persons. Farmers earlier used to grow crops like, red gram, jowar, sesamum and ragi. At present due to availability of high yielding varieties and improvement in the irrigation facilities there is a shift in the cropping pattern to cotton, maize, paddy, bengal gram and vegetables.

**3.4 Education Profile of the Households**

The average age of the head of the household is 42 years. Most of the farmers were illiterates (38.99%) followed by primary school (17.00%), high school (15.00%), graduate (12.00%). Husband is the decision maker of the family. The villagers have not undergone any vocational training in any fields like agriculture, business etc.

**3.5 Land Holding Pattern**

Majority of the cultivators were marginal farmers (75.20%) who were cultivating 36.08 per cent of total cropped area. Small farmers (16.40%) also contribute to 27.44 per cent of total cropped area. Only 0.4 per cent of them are large farmers with an area of more than 10 hectares and they contribute to 6.85 per cent of total cropped area. Details regarding distribution of land holdings are given in the Table 3.

**3.6 Soil Type**

Majority of the soils in the adopted village were black cotton soils followed by red soils.

**Table 2. Demographic particulars**

Particulars	Number
Total population	4143
Female population	2110
Male population	2033
SC population	1293
BC population	2287
OC population	520
Total number of households	1052
Average family size	4.5
Total number of cultivators	741

**Table 3. Distribution of land holdings**

Category of farmers	Size class (ha)	No. of farmers	Percentage to total no. of farmers	Cultivated area (acres)	Percentage to total cultivated area
<b>Marginal</b>	Less than 1.00	557	75.20	585	36.08
<b>Small</b>	1.00 – 2.00	122	16.40	445	27.44
<b>Semi medium</b>	2.00 – 4.00	42	5.45	245	15.15
<b>Medium</b>	4.00 – 10.00	17	2.29	235	14.47
<b>Large</b>	Above 10.00	3	0.4	112	6.85
	Total	741	100.00	1622	100.00

Source: Department of Agriculture, Government of Telangana, 2019

### 3.7 Land Utilization Pattern

The Gross cultivated area and net cultivated area in the village is 3284 acres and 1661 acres respectively. Whereas the gross irrigated area is 1448 acres (Table 4).

### 3.8 Irrigation

The major source of irrigation was wells and tube wells which covers majority of the irrigated area (Table 5).

### 3.9 Existing Cropping Pattern (2020-21)

Cotton was the principal crop grown in rainy season or *vanakalam* in the village and was followed by paddy and maize. In irrigated dry conditions, cotton was the major crop followed by maize, tomato, bhendi and other vegetables. In irrigated conditions, paddy was the major crop followed by turmeric. During *yasangi* season, maize was major crop grown under irrigated dry

conditions followed by bengal gram. In irrigated conditions, paddy occupies major area. During summer season, irrigated dry area was kept fallow and in the irrigated conditions; coriander was grown. Details of season-wise crops grown in the village are given Table 6 a,b.

**Crop Rotation:** The sequence of crop rotation generally followed in the village was:

- Situation 1: Cotton - Maize; Cotton - Bengal gram
- Situation 2: Paddy - Maize, Maize - Pulses, Maize - Bengal gram
- Situation 3: Paddy - Maize- Pulses, Paddy - Chilli – Pulses

**Inter cropping:** Very few farmers follow intercropping. The details are:

1. Maize - Redgam - 4:1
2. Cotton - Redgram/Green gram - 4:1
3. Maize - Turmeric - 4:1

**Table 4. Land utilization pattern in Damera village**

Land Utilization	Acres
Gross cultivated area	2005
Net cultivated area in <i>vanakalam</i>	1661
Net cultivated area in <i>yasangi</i>	1503
Total irrigated area	1448
Net irrigated area	1391

**Table 5. Source of irrigation in the village**

S. No	Source	Number
i)	Canals (Sriram Sagar Canal)	1
ii)	Tanks	22
iii)	Wells/Tube wells	179

Source: Department of Agriculture, Government of Telangana, 2020

**Table 6a. *Vanakalam* crops in the adopted village**

Crops	Acreage
Cotton	1249
Paddy	297
Maize	10
Red gram	01
Chilli	37
Turmeric	52
Banana	01
Tomato	05
Brinjal	08
Bottle gourd	01
Total	1661

**Table 6b. Yasangi crops in the adopted village**

Crops	Acreage
Paddy	293
Maize	1122
Bengal gram	47
Musk melon	06
Green gram	02
Tomato	12
Banana	02
Bitter gourd	01
Bhendi	01
Brinjal	02
Cabbage	01
Coriander	06
Groundnut	03
Sesamum	05
Total	1503

Source: Department of Agriculture, Government of Telangana

### 3.10 Resource Usage / Technology Adoption

a. **Seed:** Farmers highly depend on local dealers for purchasing seeds. Hybrids were preferred in cotton and maize cultivation and mainly purchased from local shop dealers. In case of paddy most of the area was covered under Sowbhagya, Aman and BPT-5204 in *vanakalam* and MTU-1010 in *yasangi* where some amount of seed was purchased from state department and Telangana seeds (Table 7).

#### Difficulties faced by the farmers in getting HYV seed are:

1. High cost of seed
2. Unavailability of seed in time

3. Lack of awareness on HYV
4. Lack of knowledge on available sources

b. **Manures and Fertilizers:** Very few farmers were applying farm yard and poultry manure to the fields. Farmers were purchasing manures from households maintaining livestock within the village, where as poultry manure was purchased from poultry units existing in village and its surroundings. Purchased manure was applied to the fields of cotton and maize. Owned livestock farm yard manure was applied to paddy. Low cattle population, high cost and non-availability of farm yard manure during peak season were the major difficulties expressed by the farmer. Crop-wise application of manures and fertilizers per hectare is given in Table 8.

**Table 7. Crop wise seed varieties cultivated and area covered**

Crop	Seed/variety	Agency / Institution	Area covered (Acres)
<b>Vanakalam</b>			
<b>Cotton</b>	Raasi 659, Bollgourd -11, Tulasi, Ujwal, Jabili	Local dealers	1249
<b>Paddy</b>	BPT-5204	Dept. of Agriculture	88
	Sowbhagya, Aman	Local dealers	113
<b>Chilli</b>	Bioseed, Pioneer	Local dealers	37
<b>Yasangi</b>			
<b>Maize</b>	Kaveri, Pioneer, Tulasi	Local dealers	1122
<b>Paddy</b>	MTU-1010	Local dealers	185
<b>Bengal gram</b>	Telangana seeds	Dept. of Agriculture	47

Source: Household survey

**Table 8. Crop-wise application of manures and fertilizers per acre**

Crop	Manure Qty.	Fertilizer		
		N Qty (kg/ac)	P Qty (kg/ac)	K Qty (kg/ac)
Cotton	4 ton*	56	46	25
Paddy	4 ton*	60	34.5	20
Maize	4 ton*	80	46	20

\* Very few farmers applied the input

Source: Calculation from household survey

The major source of fertilizers for farmers was from primary cooperatives credit societies at mandal headquarters. All the farmers were using chemical fertilizers. Farmers mostly relayed on fertilizer traders and dealers and for technical advice on officials of Dept. of Agriculture on usage of manures and fertilizers in addition to local input dealers.

#### Difficulties experienced in securing and using manures and fertilizers are:

1. Untimely availability of manures and fertilizers
2. Cost per each bag of manures and fertilizers is very high
3. Transportation problem
4. Lack of knowledge about the recommended dosages
5. Lack of appropriate technical advice

**c. Adoption of Organic Farming and INM:** Organic farming and INM was not followed in the village and heavy doses of fertilizers were applied than recommended.

**d. Plant Protection Chemicals:** Pest attack was the main reason for reduction in yields of the major crops. In paddy, brown plant hopper, stem borer, gall midge, rice blast, stem rot were observed above the economic threshold levels where as in cotton, pink boll worm, sucking pests, leaf hoppers and mealy bugs are causing major damage. In maize, fall army worm and post flowering stalk rot are causing major damage. Integrated pest management practices were followed by very few farmers in the village. Pesticides used in major crops are given (Table 9).

#### Difficulties experienced in securing and usage of plant protection chemicals:

1. Lack of knowledge on the availability of plant protection chemicals

2. High cost of chemicals
3. Abnormal weather conditions
4. Lack of knowledge about the timely application of chemicals
5. Lack of awareness on usage of personal protective equipment while mixing and spraying chemicals
6. Lack of awareness about compatibility of insecticides and fungicides

**e. Adoption of IPM:** The IPM practices being adopted by the farmers in the adopted village are given in (Table 10).

#### f. Adoption of ITKs:

- Placing bird perches in the field to allow birds to sit and predate on the pests. Fencing was used against wild boars in maize
- Tying of thin polythene sheets to scare away the birds in maize
- Hanging glass bottle with a stick to generate the sound through blowing wind to scare away birds

**g. Adoption of farm mechanization:** All the farmers in the village doesn't own required farm machinery and equipment. Farmers are managing for operations like land preparation, harvesting etc. by hiring the required equipment like tractors and harvesters (Table 11).

#### Difficulties experienced in adoption of farm mechanization are:

1. High Cost
2. Lack of institutional/ Government support
3. Lack of awareness on the availability of the equipment
4. Lack of Skill on operation of the machine
5. Maintenance of farm machines
6. Unavailability of Spare parts when damaged
7. Availability of machine on time for use

**Table 9. Usage of plant protection chemicals per hectare**

Crop	Insecticides		Fungicides		Herbicides	
	Quantity/ha	Price	Quantity/ha	Price	Quantity/ha	Price
Paddy	Carbofuran 3G 15 kg	1500/-	Propiconazole 500 ml	800/-	Oxydiargyl 30 g	350/-
	Coragen 150 ml	2710/-	Tricyclazole 300g	600/-	Pyrazosulfuran ethyl 80g	250/-
	Caldan 400 gm	500/-				
Cotton	Thiodicarb 300 gm	900/-	Mancozeb 1200g	700/-	Pendimethalin 1 lit	470/-
	NSKE 2.5 lit	2300/-	Mancozeb+carbendazim 900g	700/-	Fenoxyprop p-ethyl 250ml	500/-
	Coragen 150 ml	2710/-				
	Spinosad 150 ml	1000/-				
	Acephate 300g	500/-				
Maize	NSKE 2.5 lit	2300/-	Mancozeb 1200g	650	Atrazine 500g	300/-
	Coragen 150 ml	2710/-	Metalaxyl 2g/lit	2000	Tembotrime 40ml	660
	Carbofuran 3G	1500/-				

*Source: Household survey*



**Table 10. Adoption of IPM in various crops**

Crop	IPM Practice	Acreage
Paddy	Rope pulling against leaf folder	2 acres
	Alley ways formation against BPH	10 acres
	Pheromone traps for yellow stem borer	5 acres
Cotton	Pheromone traps for pink boll worm	3 acres
	Yellow sticky traps for whiteflies	5 acres
Maize	Pheromone traps for fall army worm	5 acres
Musk melon	Pheromone traps for fruit flies	6 acres

Source: Household survey

**Table 11. Crop-wise adoption of farm mechanization**

Crop	Farm practice / operation	Type of farm machinery used	Owned / Hired	No. of hours used per acre	Charges / hour (Rs.)	Total charges / cost (Rs.)
Paddy	Ploughing	Tractor	Hired	2	1500/-	3000/-
	Sowing	Drum seeder	Hired	4	250/-	1000/-
	Harvesting	Combined harvester	Hired	2	1200/-	2400/-
Maize and cotton	Ploughing	Tractor	Hired	2	1500/-	3000/-

### 3.11 Agricultural Labour

The total population of the village is 4143 out of which 1600 people are agricultural labour. The Available methods of employment to agricultural labour are hired labour and modes of wage payment to agricultural labour is cash and kind. The labour is deficit in the village especially during peak season. Cotton picking was the most labour intensive operation across all farm operations in major crops of the village. The farmers are managing by adopting methods like Intensive use of family labour, Engaging labourers from other areas and Shifting to alternate crops which require less labour during peak farm operations.

### 3.12 Agricultural Marketing

Damera village has no wholes sale and regulated markets. It has 8 retail shops in the village itself. The existing marketing facilities in the village are not sufficient. They are storing their produce in the godowns at Enumamula

market. However they need storage facility such as warehouses, cold storages and godowns within the vicinity of the village to reduce transportation cost. The farmers are not satisfied with the available market information. Farmers need additional information on market prices, newly released varieties and new technologies. The villagers have all weather road from which they can easily reach enumamula agricultural market. Bus facility is also available in the village. The villagers doesn't have any storage facilities. They are storing their produce in cold storage units on hired basis.

### 3.13 Technology Gap / Problems / Constraints Identified

After collecting all the information about the village and the agricultural operations, the action plan was prepared keeping in mind the gaps identified, the problems encountered and the various constraints under which the farmers have been adopting various practices (Table 12).

**Table 12. Problems/constraints/gaps identified in farm operations and action plan**

Problem / Constraints	Challenges	Plan of action
Lack of awareness on soil fertility status.	Need-based application of soil fertilizers.	Demonstrated on how to collect soil samples from the farmers' fields. Soil samples were collected in the adopted village and distributed soil health cards to the farmers.

<b>Problem / Constraints</b>	<b>Challenges</b>	<b>Plan of action</b>
Lack of awareness on new varieties of field crops.	Popularization of PJTSAU varieties.	Introduction of rice varieties WGL-44, KNM-118, WGL-962 and KNM-1638 released by PJTSAU. Seed was supplied to farmers. Average yield of 2721kg/ac (WGL-44) and 2950 kg/ac (KNM-118), 2812 kg/ac (WGL-962) and 2805kg/ac (KNM-1638) were recorded in the demonstration plots.
Labour scarcity and increased cost of cultivation in rice cultivation	Adoption of direct seeding on puddled soil	Created awareness among the farmers about the cost efficient technology by adopting direct seeding rice on puddled soil. Convinced a farmer to adopt direct seeding method in his one acre field for demonstration purpose. Various weed management techniques in wet direct seeding rice were also demonstrated. By observing all these cost effective techniques, 6 farmers adopted this technology in an area of 8 acres in the next season.
Problem of pink boll worm in Bt cotton hybrids.	Installation of pheromone traps and based on ETLs suggestion of insecticides.	Awareness was created on use of Emamectin benzoate @ 0.5g/lor use of Lambda cyhalothrin @1ml/l to reduce pest population. Demonstrated on installation of pheromone traps in 2 acres and other farmers installed pheromone traps in an area of 30 acres.
Pests and diseases in rice, maize and vegetables Stem borer, false smut and blast were the major pests and disease in the rice. Vegetables - Sucking pests, white fly and foliar diseases. Fruit fly problem in musk melon	Based on pheromone traps catches in rice, maize, tomato and muskmelon recommendation of insecticides and also promotion of integrated pest management practices	Training programme was conducted on IDM and IPM practices to control pests and diseases occurring in the crops. Prepared pamphlets and distributed literature to farmers to follow chemical control as per recommendations.
Lack of knowledge on nursery management in <i>vanakalam</i> and <i>yasangi</i> rice	Creating awareness about efficient nursery management	Awareness and training programme was organized regarding various practices to be followed in nursery.
Lack of awareness on cultivation practices, plant protection measures etc.	Frequent visits by scientists and promotion of practices based on the type of pest and disease prevailed	Advisory by scientists from time to time.
Self Help Group women are not involved in any economic activity related to production and value addition etc.	Introducing entrepreneurship skills.	Training programme was conducted on value addition of tomato to rural women and rural youth. Farmers were willing to start tomato ketchup and sauce as small enterprises.



Fig. 1. Glimpses of benchmark survey conducted in the village



Fig. 2. Damera village Map



a. Resource and Social Map of the village



b. Timeline of events in the village



c. Matrix ranking of different crops cultivated in the village



d. Students along with key informants conducting transect walk around the village



e. Venn diagram

Fig. 3. Conducting Participatory Rural Appraisal in adopted village, Damera

#### 4. CONCLUSION

- Damera village was with good institutional and infrastructural facilities. The soils in the village are black cotton soils and alluvial soils. Very few pockets of the village have red soils. The major source of irrigation was wells/tube wells and ground water levels have also been increased in last year due to heavy rainfall. The major crop grown in the village was cotton in vanakalam and maize in yasangi. Varieties like Sowbhagya, RNR 15048 and BPT 5204 in paddy and hybrids of Bioseed, Pioneer and Monsanto in cotton and Maize were mainly preferred by the farmers. Pest attack was severe across major crops grown and farmers mainly depend on input dealers for technical information.
- Storage facilities have to be improved in the village as farmers are depending on cold storages in Ennamula market for hired basis. Labour shortage is a serious problem in the village. INM was not followed in the village and heavy doses of fertilizers were applied than recommended. Zn deficiency is mainly observed in rabi paddy.
- Open defecation is a big problem in the village so measures should be taken up by constructing toilets. Adult and financial literacy programmes have to be conducted in the village to increase institutional borrowings by the farmers. Lack of knowledge on the availability of plant protection chemicals and awareness on the timely application of chemicals was observed which should be overcome.

#### 5. LIMITATIONS OF THE STUDY

- Baseline surveys serve as a benchmark for all future activities of the research. Before conducting any research, a baseline survey allows the researcher to understand the research problem by gathering information from the respondents and minimizes the effect of external variables as much as possible. The study was conducted by door-to-door method by asking questions from questionnaire. The data is self-reported by the respondents which led to over reporting. The baseline survey was also delayed as it is taking too much time to ask each and every question through

structured questionnaire which also led to high cost for involving more number of people for conducting the survey. There was a limited time to collect the data where focus group discussions could not be conducted and the survey was undertaken in about 10 days through only household interviews.

- To overcome above limitations, sufficient manpower is needed with adequate time. The questionnaire must contain open ended questions where the respondents can answer easily within the stipulated time.
- The survey provides quantitative data on how a problem affects specific groups in the research sample. It helps the researcher to define the researcher's priority areas and to understand the impact of the research. A baseline survey is an important tool that is used to record measurements of key performance indicators.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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