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Sampling Plan for Serosurveillance of FMD in Small Ruminants in Karnataka under National Animal Disease Control Programme

(NADCP) - 2022

ICAR-National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI)

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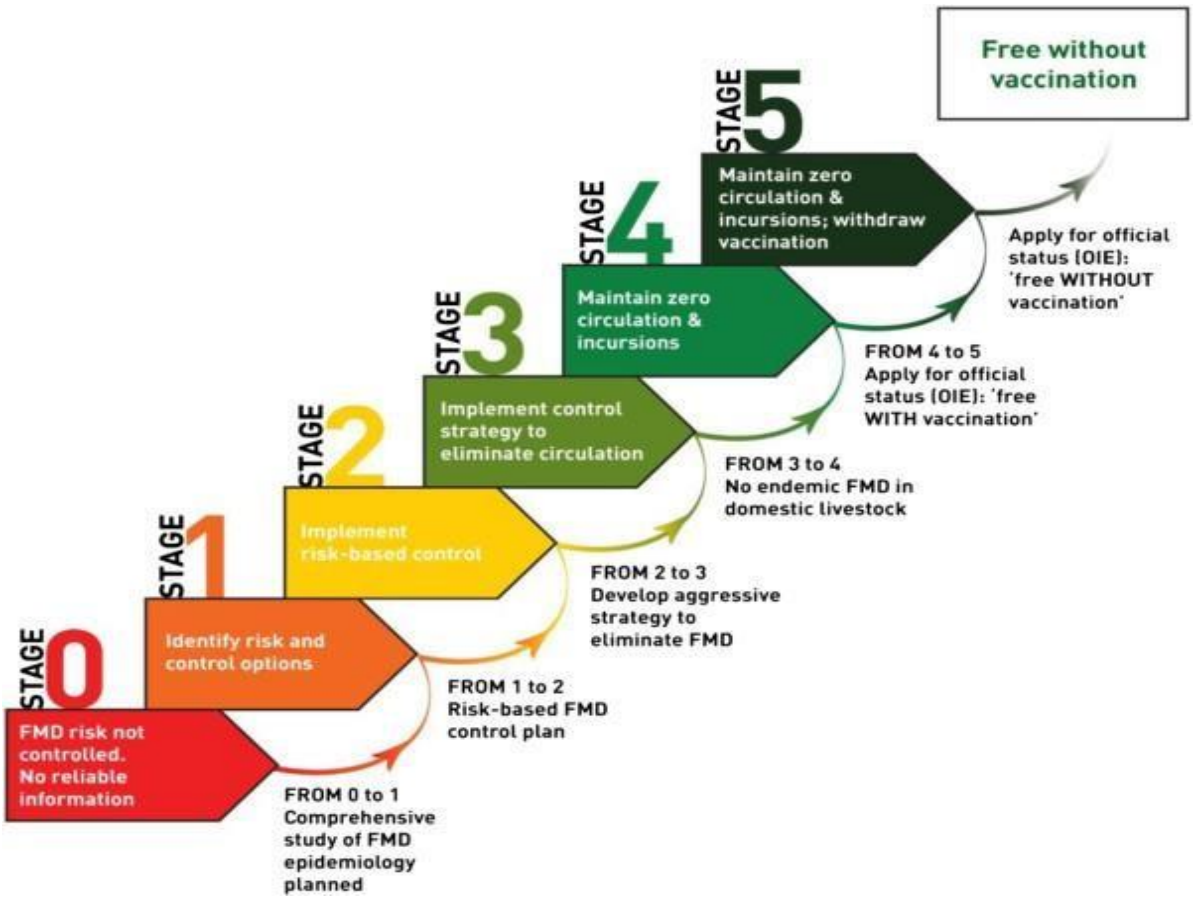
Free without vaccination
STAGE 5
Maintain zero circulation & incursions; withdraw vaccination
STAGE 4
Maintain zero circulation & incursions
STAGE 3
Implement control strategy to eliminate circulation
STAGE 2
Implement risk-based control
STAGE 1
Identify risk and control options
STAGE 0
FMD risk not controlled. No reliable information
Apply for official status (OIE): 'free WITHOUT vaccination'
FROM 4 to 5
Apply for official status (OIE): 'free WITH vaccination'
FROM 3 to 4
No endemic FMD in domestic livestock
FROM 2 to 3
Develop aggressive strategy to eliminate FMD
FROM 1 to 2
Risk-based FMD control plan
FROM 0 to 1
Comprehensive study of FMD epidemiology planned

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Introduction:

Livestock plays a pivotal role in the Indian economy, as it is an essential sector of agriculture providing income to the farmers directly or indirectly. Sustainable growth of the livestock sector can be achieved by increasing nutritional security and controlling major livestock diseases. Foot-and-mouth disease (FMD) is a clinically acute, contagious disease of cloven-footed animals (cattle buffalo, sheep, goat, pig) and causes a severe threat to the livestock economy. Karnataka state has a considerable FMD susceptible population of 29 million animals which includes Cattle (8.45 million), Buffalo (3.0 million), Goat (6.2 million), Sheep (11 million), Pig (0.3 million). FMD causes significant economic losses due to the mortality of young animals, drop in the milk production, declined productivity, and international trade restrictions. In India, the annual direct loss due to FMD is 20897 crores. As FMD is endemic in India, control strategies have the foremost importance for protecting the livestock population and revamping farmers' livelihood.

FMD control demands strict zoo sanitary measures and vaccination. Low vaccination coverage, multiple serotypes, poor cold chain maintenance infrastructure in rural areas, and unrestricted movement of animals exacerbate the control program in India. Continuous surveillance, disease monitoring, vaccine matching, and vaccine quality improvement will significantly change the Indian scenario of FMD control. In 2003-2004, the Government of India launched FMD control program with regular vaccination to prevent economic losses due to the disease and develop herd immunity in cattle. The FMD control programme is being implemented in the state since 2011, where all the eligible cattle and buffalos are vaccinated twice a year. At present the FMD vaccination programme is carried out under National Animal Disease Control Program of Government of India.

The systematic vaccination of cattle and buffaloes against FMD has resulted in considerable reduction in the number of clinical diseases, as well as number of animals getting affected. The Seromonitoring of vaccination has revealed that there is gradual building up of herd immunity in the population. The serosurveillance under National FMD Serosurveillance program has revealed reduction in infection status among cattle and buffaloes.

The small ruminants are equally susceptible to FMD, but these are not vaccinated under FMD control programme. In recent times, outbreak of FMD has been confirmed and is increasing in small ruminants. Hence, there is a necessity to study the infection status among small ruminants too. This will help to implement the strategy of FMD control in small ruminants. Therefore, random serum samples are collected from small ruminants across the state and screened by DIVA-ELISA to know the infection status and virus activity in these population.

Sampling Strategy currently used for Sero-surveillance

All form of epidemiological investigations requires the scientific sampling plan for collection of data on health problems. Estimation of prevalence of a disease is a prerequisite to establish the disease control program, hence sampling the populations in order to estimate the level of disease prevalence is common task for epidemiologists. In sampling, one should ensure that animals are representative of the target population so that the estimated value/s are unbiased and precise (low standard error). Simple random sampling, systematic or stratified random samplings are the most commonly used sampling methods.

In the developed world, which practice two stage sampling, the individual livestock farm forms the primary sampling unit. However, this concept cannot be adopted in our country as farm wise details are not available to prepare a sampling frame. Additionally, in a country where small farms (2-3 animals/household) are a norm, the farm becomes too small a unit to do the sampling. In such a situation, taking the village as primary sampling unit makes sense as fairly homogeneous population of animal exist in a village and these form a natural cluster. It is argued that in a large population where animals are separated into herds (villages in our context), disease has a strong tendency to cluster. This is becausethe disease agent or agents (whether infectious, environmental or genetic) are generally not evenly distributed throughout the population. With rare diseases, this clustering is usually even more pronounced. As a result, a particular disease may affect a very low proportion of herds-but within those affected herds, the prevalence of the disease amongst animals may be quite high. If a survey designed todetect the presence of disease fails to take into account the clustering of disease in the population, the results of the survey are likely to be very unreliable. This is because the probability formulae that the surveys are based on assumption that every unit in the population has the same probability of being affected. Another problem with large-area surveys is the logistics of sampling. The solution to both theseproblems is to use a two-stage sampling strategy in which villages form the primary sampling units (firststage), and individual animals within selected villages make secondary sampling units (second stage). Inthis way, the sample sizes at each stage can be adjusted to reflect the different disease prevalence's (the proportion of villages affected in the first stage, and the proportion of animals affected in the village at the second stage). Two-stage sampling also means that the construction of sampling frames is much simpler. At the first stage, only a list of all villages (defined epi unit) in the population is required, and atthe second stage, only animals in each of the selected villages are to be included in the list.

In this sampling scheme we employed two stage stratified random sampling, with district as stratification variable for Sheep & Goat population in different states. The present sampling strategy is a deviation from the previous sampling methodology.

The input requirements used for sampling plan were;

a. The estimated animal level prevalence
b. Theoretical village level prevalence of 20%, 15%, 10% and 5% for small (states having target population up to 1.5% of total), medium (states having target population up to 5% of total), large (states having target population up to 10 % of total), very large (states having target population more than 10% of total) states respectively to provide better representation of villageswithin the district and state.
c. diagnostic sensitivity of 60% and specificity of 100% for 3B3 NSP ELISA

Two -stage stratified random sampling plan was generated at reasonably high confidence (0.95%) using in-house developed using epi-calculator under NADRES v2 by ICAR-NIVEDI, Bengaluru.(https://nivedi.res.in/Nadres_v2/Epical/stratified/random_sampling.php). The summary of sampling plan generated using two-stage stratified random sampling scheme is presented in Table 1 &2.

Choosing random samples in selected village

It is to suggest that the random approach must be adopted to choose the animals with in the selected village. It is better to divide the selected village into four to eight directional part (viz. North, East, South, West, North-East, South-East, South-West and North-West) and each directional part equal number of animals are required to be chosen randomly. The number of animals to be chosen for each selected village is mentioned in the respective state-wise sampling plan.

For example, 16 number of animals are to be drawn from the selected villages, 2 animals to be drawn randomly from each direction of village.

Table 1: Summary of sampling plan using Two-stage stratified random sampling for SeroSurveillance of FMD in Small Ruminants in Karnataka.

STATE	NO OF DISTRICTS	NO OF BLOCKS	Total no of Sheep + Goat **	No of Animals to be Sampled	Average No of Samples Per Districts
Karnataka	30	108	17220120	1500	50

**** 20th Livestock Census (DAHD, GoI)** *Animals within 6-18 months of age must be sampled.*
Note: Samples to be collected preferably within 1-2 months before vaccination or 4-5 months after vaccination

Table 2: Summary of district wise sampling plan using Two-stage stratified random sampling for SeroSurveillance of FMD in Small Ruminants in Karnataka State.

Sl No	*District Names*	*No of Blocks (to be sampled)*	*Total no of population (Sheep + Goat) ***	*Total No of Sheep and Goat population in the sampled villages*	*Total no of samples to be Drawn*
1	*Bagalkot*	*3*	*1006782*	*3196*	*50*
2	*Bangalore Rural*	*4*	*213944*	*1365*	*60*
3	*Belgaum*	*6*	*1459420*	*4470*	*60*
4	*Bellary*	*4*	*1258684*	*12833*	*60*
5	*Bengaluru Urban*	*3*	*145337*	*1784*	*60*
6	*Bidar*	*4*	*268802*	*1587*	*60*
7	*Bijapur*	*4*	*916168*	*3989*	*60*
8	*Chamarajanagar*	*2*	*279954*	*2461*	*60*
9	*Chikballapur*	*3*	*801585*	*2604*	*60*
10	*Chikmagalur*	*2*	*139002*	*1831*	*60*
11	*Chitradurga*	*3*	*1737145*	*3592*	*60*
12	*Dakshin Kannad*	*3*	*32504*	*1121*	*60*
13	*Davangere*	*6*	*630172*	*2921*	*60*
14	*Dharwad*	*3*	*153938*	*1373*	*60*
15	*Gadag*	*5*	*587555*	*20425*	*60*
16	*Gulbarga*	*4*	*558587*	*1834*	*60*
17	*Hassan*	*5*	*328445*	*804*	*60*
18	*Haveri*	*5*	*458174*	*9113*	*60*
19	*Kodagu*	*2*	*8253*	*468*	*60*
20	*Kolar*	*4*	*577605*	*2422*	*60*
21	*Koppal*	*4*	*797945*	*4354*	*60*
22	*Mandya*	*2*	*693563*	*1747*	*60*
23	*Mysore*	*4*	*411669*	*2094*	*60*
24	*Raichur*	*4*	*940351*	*5379*	*60*
25	*Ramanagara*	*3*	*278118*	*2365*	*60*
26	*Shimoga*	*2*	*102245*	*808*	*60*
27	*Tumkur*	*3*	*1717934*	*2968*	*60*
28	*Udupi*	*3*	*3107*	*424*	*60*
29	*Uttar Kannad*	*5*	*19192*	*536*	*60*
30	*Yadgir*	*3*	*693940*	*4281*	*60*
	Total	***108***	***17220120***	***105149***	***1790***

Note:

Number of reserved villages =29

Total number of samples in Reserved villages =290

Total No of samples(Final)= 1790-290=1500

Standard Operating Procedure (SOP) for Collection and Dispatch of Sheep and Goat Serumunder National FMD Serosurveillance

General requirements: Aseptic precautions should be observed right from collection of blood to dispatch of serum. It is advisable to wear gloves at all times (be it removal of stopper from vacutainer, centrifugation, pipetting, disposal of contaminated tubes, and clean-up of any spills) while handling the specimens. Used vacutainers, needles, and pipets must be properly disposed in accordance with biosafety/institutional requirements.

Serum Collection

Sample collection
Samples were collected from sheep and goat

Materials required

- Vacutainers 5 ml capacity (Red Top, BD Catalogue No. 366430)
- Desktop Centrifuge (refrigerated preferably) with swinging bucket rotor
- Sterile 15ml polypropylene centrifuge tubes
- Sterile Cryovials (preferably internal threaded)
- 2ml, 5ml pipettes or 1ml micro pipettes and 1 ml sterile pipette tips.
- Ice Buckets
- Laminar Flow cabinet

Serum Separation Procedure

- Keep the vacutainer in a slanting position after the blood is drawn (draw blood only up to 2/3 of the maximum volume) at room temperature for a minimum of 30 to a maximum of 60 minutes to allow the clot to form.

- If the blood is not centrifuged immediately after the clotting time, the tubes should be placed on ice or refrigerated. (4ºC).

- Transfer the content of the vacutainer to a sterile 15 ml centrifuge tube (if you are doing this in the lab kindly use laminar flow).

- Centrifuge the blood sample at in a swing-out rotor for 20 minutes at 1100-1300 g at room temperature.

Warning: Excessive centrifuge speed (over 2000 g) may cause tube breakage

- At the end of the centrifugation transfer the serum (Recommendation: do not pour!) to a sterile labelled cryovial (preferably internal threaded) using a pipette. Close the caps on the vials tightly.

> **Note:** It would be wise to keep the pipet above the red blood cell layer and leave a small amount of serum in the tube so as avoid picking up red blood cells.

- Check that all aliquot vial caps are secure and labelled.
- Place all aliquots upright in a specimen box or rack in -20^{0}C or colder freezer. All specimens should remain at -20^{0}C or below prior to shipping.

Serum Shipping Instructions

- Use at least 1-inch thick walled thermocol box for shipping of serum
- The serum samples should be preferably shipped in dry ice, if not add sufficient number of ice packs which were earlier stored in -80^{0}C. If ice packs are used for shipping, ensure that samples are placed within layer of icepacks.
- Kindly ensure that there is no leakage during shipment. To do this it wise to keep the vials in a cryo box.
- Ship the serum as quickly as possible, preferably by overnight courier.
- Inform DFMD/relevant laboratory through telephone call about the shipping.
- Ensure that the samples are accompanied by standard proforma attached herewith in appendix II (proforma for serum dispatch to ICAR-DFMD/Relevant Lab)

Please contact for any clarifications on SOP and Sampling plan issues:

For any clarifications on SOP and Sampling plan issues, please contact:

1. Dr. K.P. Suresh, Principal Scientist : 7892791174
2. Dr. Raveendra Hegde, Professor : 9448358705

Proforma for serum collection in the field

Sample ID: **Date of Sampling (DD/MM/YYYY):**

Owner's Name: **Mob No.:**

Village: **Tehsil/Block:**

District: **State:**

Pin code:

Species of animals (Tick the correct one)

Sheep Goat

Sex (Tick the correct one)

Male Female

Age in Months (write the age)

Health status of the animal (Tick the correct one)

Apparently Healthy Diseased: Yes/No

Suspected disease (If Yes):

Vaccination History

Vaccinated/not vaccinated

Date of vaccination

Remarks if any:

Proforma for Serum Dispatch to FMD Regional Centre, IAH&VB, Bangalore

Ref No.: **Date:**

Sender:

Sl. No.	Sample ID	Date of Sampling	Owner's Name	Mob No.	Village	Block/Tehsil	District	PIN Code	Animal Species	Age in Months	Sex

Stratified Random Sampling - Karnataka (Code - 16)

Species Selected for Stratification = Sheep + Goat
Number of Villages Having 50 + (Sheep + Goat) = 22848
Knowledge level = 0.35
Cluster Level = 0.035
Sensitivity of the test used = 0.6
Total No of Villages (Clusters) Selected = 150 (+29 Reserved Villages)
Total No of Animals to be Sampled = 1500

DISTRICT_NAME	BLOCK_NAME	VILLAGE_NAME	Goats	Sheep	Sheep + Goat	No of units to Sample	Goat Proportion	Sheep Proportion	
Bagalkot	Badami	Govanakoppa	202	86	288	10	7	3	
Bagalkot	Badami	Mangalur	338	683	1021	10	3	7	
Bagalkot	Bagalkot	Devalapur (S.M.)	193	950	1143	10	2	8	
Bagalkot	Hungund	HIRE KODAGALI THANDA	13	208	221	10	1	9	
Bagalkot	Hungund	Chickkodagali	141	382	523	10	3	7	
Bangalore Rural	Nelamangala	Kodigehalli	51	22	73	10	7	3	
Bangalore Rural	Devanahalli	Chinnappanayakana Hosur	60	120	180	10	3	7	
Bangalore Rural	Dod Ballapur	Marimakanahalli (D)	92	99	191	10	5	5	
Bangalore Rural	Dod Ballapur	Nagenahalli	122	110	232	10	5	5	
Bangalore Rural	Nelamangala	HOTTEPPANAPALYA	46	224	270	10	2	8	
Bangalore Rural	Hosakote	Begur	97	322	419	10	2	8	**Reserved**
Belgaum	Hukeri	Gudaganatti (Rc)	150	4	154	10	10	0	
Belgaum	Savadatti	Ramanagar	416	0	416	10	10	0	
Belgaum	Harugeri	Harugeri-Ward No.23	609	72	681	10	9	1	
Belgaum	Belgaum	Halabhavi	1237	0	1237	10	10	0	
Belgaum	Khanapur	Devalatti	247	0	247	10	10	0	
Belgaum	Athni	Kannal	497	1238	1735	10	3	7	**Reserved**
Bellary	Kudligi	MARURU	57	30	87	10	7	3	
Bellary	Kudligi	Belligatta	232	299	531	10	4	6	
Bellary	Sandur	HUCHCHENAHALLI	752	404	1156	10	7	3	
Bellary	Sandur	Nidugurthi	1376	258	1634	10	8	2	
Bellary	Hagaribommanahalli	Hansi	0	122	122	10	0	10	
Bellary	Siruguppa	Sirigeri	1824	7479	9303	10	2	8	**Reserved**
Bengaluru Urban	Anekal	KALESHWARI	12	81	93	10	1	9	
Bengaluru Urban	Bangalore South	GAVIYANA PAALYA	8	113	121	10	1	9	
Bengaluru Urban	Anekal	Muthasandra	0	168	168	10	0	10	
Bengaluru Urban	Anekal	Kalanaikanahalli	150	48	198	10	8	2	
Bengaluru Urban	Bangalore North	Bangalore (M Corp.) - Ward No.7	47	66	113	10	4	6	
Bengaluru Urban	Bangalore South	Bangalore (M Corp.) - Ward No.130	254	837	1091	10	2	8	**Reserved**
Bidar	Aurad	Nagur Babji	98	0	98	10	10	0	
Bidar	Basavakalyan	Belura	235	16	251	10	9	1	
Bidar	Bidar	Khadernagar	218	151	369	10	6	4	
Bidar	Bhalki	Malchapur	537	0	537	10	10	0	
Bidar	Bhalki	Dongargi	68	0	68	10	10	0	
Bidar	Basavakalyan	JAFFARWADI	264	0	264	10	10	0	**Reserved**
Bijapur	Sindgi	Bableshwar	287	8	295	10	10	0	
Bijapur	Muddebihal	Gundakanal	314	220	534	10	6	4	
Bijapur	Basavana Bagevadi	Kirshyal	310	977	1287	10	2	8	
Bijapur	Bijapur	Tidagundi	1117	235	1352	10	8	2	
Bijapur	Basavana Bagevadi	Akalwadi	165	47	212	10	8	2	
Bijapur	Sindgi	Turkangeri	291	18	309	10	9	1	**Reserved**
Chamarajanagar	Gundlupet	Gundlupet (TMC) - Ward No.21	43	33	76	10	6	4	
Chamarajanagar	Gundlupet	Madrahalli	37	206	243	10	2	8	
Chamarajanagar	Kollegal	Uddanur	189	140	329	10	6	4	
Chamarajanagar	Kollegal	NALLURU	386	2	388	10	10	0	
Chamarajanagar	Gundlupet	MALLAIAHAPURAD	110	171	281	10	4	6	
Chamarajanagar	Kollegal	SANDANAPAALY	1063	81	1144	10	9	1	**Reserved**
Chikballapur	Chikkaballapura	Gongadipura	9	43	52	10	2	8	
Chikballapur	Sidlaghatta	Yedulathippenahalli	52	220	272	10	2	8	
Chikballapur	Gudibanda	Bathalahalli	154	260	414	10	4	6	
Chikballapur	Sidlaghatta	Athiganahalli	243	268	511	10	5	5	
Chikballapur	Sidlaghatta	S.Gollahalli	77	510	587	10	1	9	

Reserved villages to be used for sampling if any selected village in given district is not accessible, having logistic probelm or any other issues

Chikballapur	Chikkaballapura	Kariganapalya	224	544	768	10	3	7	**Reserved**
Chikmagalur	Chikmagalur	Athigiri	58	0	58	10	10	0	
Chikmagalur	Chikmagalur	Gonakal	106	40	146	10	7	3	
Chikmagalur	Chikmagalur	Aralaguppe	238	30	268	10	9	1	
Chikmagalur	Chikmagalur	Lakya	310	114	424	10	7	3	
Chikmagalur	Tarikere	Tarikere (TP) - Ward No.14	56	23	79	10	7	3	
Chikmagalur	Chikmagalur	Sadarahalli	684	172	856	10	8	2	**Reserved**
Chitradurga	Hosdurga	Madhure	11	86	97	10	1	9	
Chitradurga	Chitradurga	Lakshmisagara	142	362	504	10	3	7	
Chitradurga	Hosdurga	Vengalapura	605	568	1173	10	5	5	
Chitradurga	Challakere	Somaguddu	356	1118	1474	10	2	8	
Chitradurga	Hosdurga	Goravinakal	44	7	51	10	9	1	
Chitradurga	Challakere	Challakere (TMC) - Ward No.25	19	274	293	10	1	9	**Reserved**
Dakshin Kannad	Mangalore	Kalavar	74	0	74	10	10	0	
Dakshin Kannad	Puttur	Bettampady	95	0	95	10	10	0	
Dakshin Kannad	Bantval	Perne	127	0	127	10	10	0	
Dakshin Kannad	Mangalore	Pavoor	144	0	144	10	10	0	
Dakshin Kannad	Mangalore	BAJPE	277	51	328	10	8	2	
Dakshin Kannad	Puttur	Koila	353	0	353	10	10	0	**Reserved**
Davangere	Channagiri	Kagathur	6	61	67	10	1	9	
Davangere	Jagalur	Lakkampura	6	183	189	10	0	10	
Davangere	Davanagere	Arasapura	200	159	359	10	6	4	
Davangere	Honnali	Hanumasagara	620	151	771	10	8	2	
Davangere	Harapanahalli	Harapanahalli (TP) - Ward No.4	0	115	115	10	0	10	
Davangere	Harihar	Yalehole	480	940	1420	10	3	7	**Reserved**
Dharwad	Hubballi-Dharwad	Hubli-Dharwad (M Corp.) - Ward No.27	78	11	89	10	9	1	
Dharwad	Dharwad	Amboli	174	3	177	10	10	0	
Dharwad	Dharwad	Kabbenur	86	165	251	10	3	7	
Dharwad	Dharwad	Mandihal	248	10	258	10	10	0	
Dharwad	Annigeri	Annigeri (TMC) - Ward No.3	24	42	66	10	4	6	
Dharwad	Dharwad	Mansur	528	4	532	10	10	0	**Reserved**
Gadag	Naregal	Naregal (TP) - Ward No.4	182	5	187	10	10	0	
Gadag	Shirhatti	Shirhatti (TP) - Ward No.7	198	142	340	10	6	4	
Gadag	Shirhatti	Chavadal	267	907	1174	10	2	8	
Gadag	Ron	Mugali	602	917	1519	10	4	6	
Gadag	Lakshmeshwar	Lakshmeshwar (TMC) - Ward No.11	71	18	89	10	8	2	
Gadag	Mundargi	Chikkawaddatti	5010	12106	17116	10	3	7	**Reserved**
Gulbarga	Shahabad	Shahabad (TMC) - Ward No.27	95	0	95	10	10	0	
Gulbarga	Gulbarga	Dharmapur	294	0	294	10	10	0	
Gulbarga	Jevargi	Bhosga (B)	487	0	487	10	10	0	
Gulbarga	Sedam	Madkal	394	230	624	10	6	4	
Gulbarga	Shahabad	Shahabad (TMC) - Ward No.5	57	0	57	10	10	0	
Gulbarga	Gulbarga	Kagganmardi	275	2	277	10	10	0	**Reserved**
Hassan	Hole Narsipur	Kongalabeedu	15	54	69	10	2	8	
Hassan	Channarayapatna	Kallumallenahalli	39	93	132	10	3	7	
Hassan	Hassan	H.Mylahalli	33	156	189	10	2	8	
Hassan	Hole Narsipur	Gaddehosur	62	149	211	10	3	7	
Hassan	Belur	Malenahalli	0	52	52	10	0	10	
Hassan	Arsikere	Valehalli	0	151	151	10	0	10	**Reserved**
Haveri	Savanur	Savanur (TMC) - Ward No.5	51	17	68	10	8	3	
Haveri	Byadgi	Byadgi (TMC) - Ward No.18	128	55	183	10	7	3	
Haveri	Ranibennur	Nadiharalalli	65	269	334	10	2	8	
Haveri	Hirekerur	Kunchur	344	137	481	10	7	3	
Haveri	Ranibennur	Ranibennur (CMC) - Ward No.26	34	534	568	10	1	9	
Haveri	Haveri	Havanur	2570	4909	7479	10	3	7	**Reserved**
Kodagu	Somvarpet	Cherala Srimangala	58	0	58	10	10	0	
Kodagu	Virajpet	Nittur	84	0	84	10	10	0	
Kodagu	Virajpet	Arekeri Forest - I	91	0	91	10	10	0	
Kodagu	Virajpet	Kutta	92	0	92	10	10	0	

Kodagu	Somvarpet	Malambi	65	0	65	10	10	0	
Kodagu	Virajpet	Gonikoppal (Ct)	78	0	78	10	10	0	**Reserved**
Kolar	Robertson Pet	Robertson Pet (CMC) - Ward No.15	56	0	56	10	10	0	
Kolar	Bangarapet	Dinnur	36	220	256	10	1	9	
Kolar	Srinivaspur	Valagernahalli	105	278	383	10	3	7	
Kolar	Malur	Dinnahalli	159	277	436	10	4	6	
Kolar	Bangarapet	Guttahalli	24	423	447	10	1	9	
Kolar	Bangarapet	Peelavara	72	772	844	10	1	9	**Reserved**
Koppal	KARATAGI	Karatagi - Ward No.9	78	140	218	10	4	6	
Koppal	Gangawati	Herur	44	808	852	10	1	9	
Koppal	Koppal	Ganganhal	58	940	998	10	1	9	
Koppal	Yelbarga	Budur	387	756	1143	10	3	7	
Koppal	Gangawati	Battarnarsapur	22	91	113	10	2	8	
Koppal	Gangawati	Mylapur	285	745	1030	10	3	7	**Reserved**
Mandya	Nagamangala	Kesavinakatte	87	55	142	10	6	4	
Mandya	Mandya	Heggadathahalli	63	151	214	10	3	7	
Mandya	Mandya	Manuganahalli	177	165	342	10	5	5	
Mandya	Mandya	Mangala	411	109	520	10	8	2	
Mandya	Mandya	Chamalapura	63	180	243	10	3	7	
Mandya	Nagamangala	Gidavinachannapura	81	205	286	10	3	7	**Reserved**
Mysore	Nanjangud	Kongahalli	0	117	117	10	0	10	
Mysore	Mysore	Madhavagere	52	131	183	10	3	7	
Mysore	Mysore	Madahalli	183	167	350	10	5	5	
Mysore	Tirumakudal - Narsipur	Madavadi	254	222	476	10	5	5	
Mysore	Tirumakudal - Narsipur	Kotthegala	161	247	408	10	4	6	
Mysore	Krishnarajanagara	Meluru	208	352	560	10	4	6	**Reserved**
Raichur	Lingsugur	Ashihal	34	79	113	10	3	7	
Raichur	Turuvihalla	Turuvihalla (TP) - Ward No.4	9	204	213	10	0	10	
Raichur	Manvi	Devipur	57	633	690	10	1	9	
Raichur	Lingsugur	Gonwatla	183	651	834	10	2	8	
Raichur	Lingsugur	Mudwal	134	49	183	10	7	3	
Raichur	Raichur	Ayazpur	257	3089	3346	10	1	9	**Reserved**
Ramanagara	Magadi	Bittasandra	91	20	111	10	8	2	
Ramanagara	Magadi	Nagamangala	38	115	153	10	2	8	
Ramanagara	Channapatna	Halehalli	166	149	315	10	5	5	
Ramanagara	Channapatna	Thavatanahalli	69	361	430	10	2	8	
Ramanagara	Magadi	Chandurayanahalli	90	22	112	10	8	2	
Ramanagara	Kanakapura	Sasalapura	705	539	1244	10	6	4	**Reserved**
Shimoga	Shimoga	Ittige Halli	16	65	81	10	2	8	
Shimoga	Bhadravati	Masarahalli	11	91	102	10	1	9	
Shimoga	Bhadravati	Aralihalli	6	140	146	10	0	10	
Shimoga	Shimoga	Basavapura	165	3	168	10	10	0	
Shimoga	Bhadravati	BILIKI TANDA	51	82	133	10	4	6	
Shimoga	Shimoga	Korala Halli	7	171	178	10	0	10	**Reserved**
Tumkur	Koratagere	Kaluvehalli	76	5	81	10	9	1	
Tumkur	Koratagere	Duddanahalli	37	321	358	10	1	9	
Tumkur	Turuvekere	Guralamata	341	353	694	10	5	5	
Tumkur	Turuvekere	Madihalli	306	437	743	10	4	6	
Tumkur	Koratagere	Bodabandenahalli	263	106	369	10	7	3	
Tumkur	Kunigal	Huruliborasandra	226	497	723	10	3	7	**Reserved**
Udupi	Karkal	Miyar	58	0	58	10	10	0	
Udupi	Udupi	Nadsal (Ct)	60	0	60	10	10	0	
Udupi	Kundapura	Gangolli	76	0	76	10	10	0	
Udupi	Karkal	Bola	80	0	80	10	10	0	
Udupi	Kundapura	Kedoor	70	0	70	10	10	0	
Udupi	Karkal	Bola	80	0	80	10	10	0	**Reserved**
Uttar Kannad	Sirsi	Bengle	23	35	58	10	4	6	
Uttar Kannad	Haliyal	Chotakanshirda	66	0	66	10	10	0	
Uttar Kannad	Mundgod	Andalgi	105	34	139	10	8	2	
Uttar Kannad	Mundgod	Chowdalli	92	54	146	10	6	4	
Uttar Kannad	Supa	Timbholi	52	0	52	10	10	0	
Uttar Kannad	Yellapur	Kanchanahalli	75	0	75	10	10	0	**Reserved**
Yadgir	Shorapur	Murakanal	73	5	78	10	9	1	
Yadgir	Shahpur	Kyatnal	60	434	494	10	1	9	
Yadgir	Shorapur	Shorapur (TMC) - Ward No.10	642	180	822	10	8	2	
Yadgir	Shahpur	Bendebembli	188	831	1019	10	2	8	
Yadgir	Yadgir	Wadwat	145	11	156	10	9	1	
Yadgir	Yadgir	Viswaspur	1247	465	1712	10	7	3	**Reserved**

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