



**Global Alliance
for Rabies
Control**

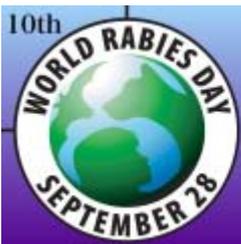
RABID BYTES

The newsletter of The Global Alliance for Rabies Control

Global Framework to Eliminate Rabies	2
Rabies Awareness Month, Philippines	3
Rabies Educator Students, Philippines	4
Veterinarian Trainers in South Africa	4
GARC and Friedrich-Loeffler-Institut	5
Hayana Project	5
Tracking Progress of NTDs	6
Mobile App Boosts Rabies Control	7
Diagnosing Rabies	8
Vaccination Campaign Protects Tigers	9
Soccer and Rabies Awareness	10
Recent Research	11
Upcoming Conferences	12

EDITORIAL

September 28, 2016 is the 10th World Rabies Day



RABIES

Educate • Vaccinate • Eliminate

www.rabiesalliance.org/world-rabies-day

September 28, 2016 will be the 10th World Rabies Day. Over the years the event, with your help, has educated millions of people who live at daily risk of exposure to the disease and has resulted in the vaccination of millions of dogs. These efforts have saved lives.

Ten years is a long time and is a natural moment for reflection. Much has been achieved in that time.

Since we began, momentum has been gathering behind rabies prevention. At the global meeting organised by FAO, GARC, OIE and WHO in Geneva last December, countries agreed on a target of zero human deaths from dog-mediated rabies by 2030. Such a unified vision is a major milestone and we as a community need to seize on it and push forward.

The growth of the internet and social media have made communication with you, the rabies prevention community, easier and more fruitful than ever, enabling us to share resources and experiences and support each other as we move towards rabies elimination.

So in this landscape, what is the role of World Rabies Day in 2016? We've come up with a list (which is by no means exhaustive):

- to motivate action for rabies prevention;
- to raise awareness among at-risk communities of rabies transmission, how to prevent exposure and what to do if exposed;
- to connect and motivate people working in rabies prevention (you are not alone!)
- to shine a light on that work to attract funding; and
- to demonstrate the commitment and determination of the community and garner further political support for the goal of elimination of human deaths.

(We'd love to hear from you if have further additions!)

World Rabies Day is the only global event focused on rabies prevention and, as a result, has grown year-on-year. Of course, we're hoping it will grow again this year and that you'll support it by getting involved.

The theme for 2016 is simple but we believe it sums up what has been achieved and where we're going:

Rabies: Educate. Vaccinate. Eliminate.

Please start thinking about and registering your events now. There are some ideas [here](#) and more resources coming online over the next few weeks. Updates will be advertised on our [Facebook](#) and [Twitter](#) feeds. Let's make the world sit up and take notice. **#WorldRabiesDay**

By Louis Nel, Executive Director, GARC and Liz Davidson, World Rabies Day Coordinator, GARC

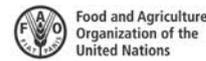
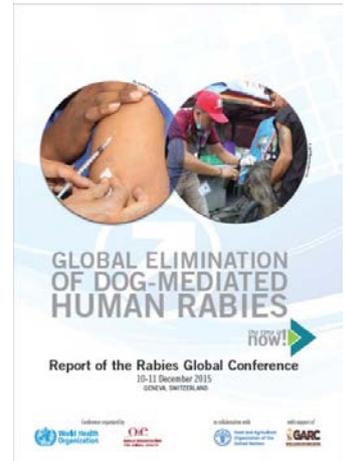
NEWS FROM GARC AND WRD

The Global Framework to Eliminate Rabies Deaths by 2030

On March 16th, the OIE and WHO, FAO and GARC released the final version of the [global framework for the elimination of dog-mediated human rabies](#). The final document reflects discussions and feedback from the nearly 300 participants at the Global Conference, Global elimination of dog-mediated human rabies: The time is now, held in Geneva on 10-11 December 2015. Its agreement represents a milestone in efforts to eliminate canine rabies.

Built on the five pillars of rabies elimination (STOP-R), the action plan combines socio-cultural, technical, organisational, political, and resource-oriented aspects, and it emphasises three key aspects of rabies control. First, the most cost-effective way to eliminate rabies is to prevent it at source, through mass vaccination of dogs. Second, human vaccine must be accessible and affordable for those people potentially exposed to rabies. Third, there is a need for education and increased awareness of all aspects of rabies control.

Commenting on the framework, Prof. Louis Nel, Executive Director of GARC said: “This framework demonstrates wide-ranging cooperation and consensus on a clear path forward. With such a cohesive approach, we are taking the first bold strides towards the global elimination of this gruesome disease.



GLOBAL FRAMEWORK FOR THE ELIMINATION OF DOG-MEDIATED HUMAN RABIES

Dog-mediated human rabies kills tens of thousands of people every year worldwide. Freedom from dog-mediated human rabies is a global public good and is feasible with currently available tools.

In accordance with the consensus of the Global Conference (Geneva, 10-11 December 2015), this framework provides a coordinated approach and vision for the global elimination of dog-mediated human rabies. It is intended to harmonize actions and provide adaptable, achievable guidance for country and regional strategies.

The five pillars of rabies elimination (STOP-R)

1 SOCIO-CULTURAL

Rabies control involves a wide range of stakeholders including the general public. The socio-cultural context influences rabies perceptions and dog-keeping practices of at-risk populations. Understanding the context guides approaches to motivate behavioural change and plan feasible delivery of services.

Includes activities for:

- **Awareness:** build awareness of dog-mediated rabies as a preventable global public health problem including through participation in initiatives such as World Rabies Day and the EndRabiesNow campaign
- **Responsible dog ownership:** promote responsible dog ownership and dog population management practices, including dog vaccination, in accordance with OIE standards
- **Bite prevention and treatment:** develop and implement education programmes on bite prevention and first aid for both children and adults
- **Post-exposure prophylaxis:** increase awareness and understanding of post-exposure prophylaxis (PEP) imperatives and options including intradermal administration
- **Community engagement:** encourage community involvement and engagement in activities to eliminate dog-mediated rabies

2 TECHNICAL

Effective animal health and public health systems are required to eliminate dog-mediated human rabies. These systems must be strengthened and resourced appropriately, and gaps identified and filled.

Includes activities for:

- **Vaccination:** ensure safe, efficacious and accessible dog and human vaccines and immunoglobulins, and promote and implement mass dog vaccination as the most cost-effective intervention to achieve dog-mediated human rabies elimination
- **Logistics:** collect data on needs forecasts to inform the vaccine procurement system and to create and sustain the logistics and infrastructure required for effective delivery and implementation of mass dog vaccination programmes and PEP administration
- **Diagnostics:** ensure capacity and capability for rapid and accurate rabies diagnosis through accessible, well-equipped laboratories and trained personnel
- **Surveillance:** support improved surveillance, sampling, reporting, and data-sharing
- **Technical support:** provide guidance and technical support for the development and tailoring of regional and national plans, including promoting the use of existing tools
- **Proof of concept:** support proof-of-concept programmes, and then scale up through leveraging of success

3 ORGANIZATION

The One Health approach of close collaboration is applied. Leadership, partnership and coordination for rabies elimination activities arise from the human health and animal health sectors and other stakeholders.

Includes activities for:

- **One Health:** promote the One Health approach and intersectoral coordination through national and regional networks
- **Good governance:** establish good governance, including clear roles, chain of command, measurable outcomes and timelines
- **Harmonization:** align work plans and activities with national and regional priorities and approaches fostering synergies among sectors
- **Coordination:** coordinate and combine human resources, logistics and infrastructure of other programmes and initiatives, as appropriate and feasible
- **Indicators and performance:** identify targets and their indicators to support performance measurement, including surveillance and validation data, to identify areas requiring attention or extra support
- **Monitoring and evaluation:** support monitoring and evaluation of national plans to ensure timely and cost effective delivery

4 POLITICAL

Success depends on political will and support for elimination of dog-mediated human rabies. Political will results from recognition of rabies elimination as a national, regional and global public good.

Includes activities for:

- **Political support:** political support is essential and most relevant during and following country instability (political upheaval, natural disasters, etc.)
- **International support:** encourage countries to request a resolution on dog-mediated human rabies elimination through the World Health Assembly (WHO) and the General Assembly of Delegates (OIE)
- **Legal frameworks:** establish and enforce appropriate legal frameworks for rabies notification and elimination
- **Demonstrating impacts:** demonstrate the compelling case for mass dog vaccination programmes and their impact on protecting and saving human lives
- **Regional engagement:** support active national and regional engagement and cooperation to commit to a rabies elimination programme and promote the exchange of lessons learnt and experiences to leverage resources and engagement

5 RESOURCES

Rabies elimination activities frequently span several years and therefore require sustained, long-term support.

Includes activities for:

- **Case for investment:** promote the case for investment in dog-mediated human rabies elimination to persuade countries, policy makers and donors of the feasibility, merit and value of investing in rabies elimination strategies
- **Business plans:** prepare business plans based on the Global Framework for Dog-mediated Human Rabies Elimination
- **Investment:** encourage different forms of investment and partnerships (private and public investment) to leverage resources and engagement

CRITICAL SUCCESS FACTORS

- Long-term political and social commitment
- Community engagement
- Sustainable vaccination of 70% of the at-risk dog population
- Proof of concept: start small, scale up
- Sufficient resources, logistics and infrastructure
- Promote vaccine banks and other strategies for acquisition of rabies immunoglobulins to ensure sufficient supply of quality-assured rabies vaccines and human immunoglobulin
- Reach remote, rural and at-risk populations
- Conduct performance measurement at all levels
- Maintain trained and motivated implementation personnel

STRATEGIC VISION: zero human deaths from dog-mediated rabies by 2030 in participating countries

A new campaign co-ordinated by GARC, [End Rabies Now](#), is working to increase the visibility of rabies on the international health agenda and amongst policymakers, in support of the global framework towards rabies elimination.

Submitted by Louise Taylor, GARC. The full conference report is available [here](#).

Rabies Awareness Month in the Philippines

Forewarned is forearmed, as they say, and this is particularly true in the case of rabies. To this aim, the Philippines government dedicate March as Rabies Awareness Month.

This year GARC took part in a series of activities that reached out to the public and professional community and engaged them in discussion about the disease.

The Philippines Information Agency held a press conference on March 10. Our friends and colleagues Dr. Rodolfo J. Ragadi from the Provincial Health Office and Provincial Veterinarian Dr. Loida M. Valenzuela joined GARC field veterinarian Dianne Licuan as resource speakers. Following a discussion about rabies, responsible pet ownership, and prevention, the local representatives from television, radio, print, and online had the opportunity to ask questions and seek clarifications.

Radio is an effective way at reaching mass audiences and in Ilocos Norte we were delighted to work with both Bombo Radyo and Radyo ng Banyan.



Dr. Rodolfo J. Ragadi from the Provincial Health Office and Provincial Veterinarian Dr. Loida M. Valenzuela joined GARC field veterinarian Dianne Licuan during the broadcast on Radyo Bombo. Photo courtesy of GARC.



GARC Field Veterinarian Dianne Licuan presents Mrs. Marieta Rivera, an avid listener of Bambo Radyo, with her prize of telephone load card of P200.00. Photo courtesy of GARC.

Again, Dr. Ragadi and Dr. Valenzuela joined us on Bombo Radyo to discuss rabies, responsible pet ownership, and prevention. And, in a separate weekly broadcast on the station, our field veterinarian, Dianne Licuan, had a weekly 30 minute slot on Friday mornings. Listeners had the chance to win prizes by correctly answering questions based on the previous week's broadcast (to encourage people to tune in week after week).

Here you can see Mrs. Marieta Rivera, an avid listener of Bambo Radyo, with her prize of telephone load card of P200.00. She correctly answered the question: What are the necessary steps in animal bite management? (First to wash the wound with soap and running water for 15 minutes, apply wound disinfectant and bring immediately to the nearest animal bite treatment center/animal bite center.)

Meanwhile, Radyo ng Banyan broadcast a rabies question every day. Again, listeners sent SMS messages with the correct answer for a chance to win prizes donated by GARC and INMS (Ilocos Norte Medical Society).

Having media time is a fantastic boost but the disease also needs year round advocates with a sound knowledge of the disease. The Rabies Educator Certificate delivers this knowledge and our staff joined participants at the Ilocos Norte Medical Society convention on 12 March to tell them about the course. Doctors have an important role in moving towards rabies elimination and the team were delighted that those at the conference showed a real interest learning more.

In Muntinlupa, a city in Metro Manila, some talented high school students used their artistic skills to create awareness posters. Congratulations goes to Mark Ian G. Papa (of Muntinlupa Business High School), and Abigail Bernabe and Axel Helmsky B. Buen (both Muntinlupa Science High School) for coming 1st, 2nd and 3rd respectively. And well done to everyone who took part – choosing the winning entries was difficult!



The winners of the poster competition in Muntinlupa. (From left to right) Mark Ian G. Papa (1st place, Muntinlupa Business High School), and Abigail Bernabe and Axel Helmsky B. Buen (2nd and 3rd place, Muntinlupa Science High School). Photo courtesy of GARC.

And finally to Sorsogon, where the Sorsogon Community Based Theatre Group performed a new musical production *Tandok?* Tandok means 'faith healer' and addressed the common practice of taking bite victims to traditional healers rather than medical centres. Performed in Tagalog, the local language, the play was a hit with everyone in the audience of 300 people - old and young.

The play was written by Bicol Univeristy's Prof. Julio Mendoza and directed by Dan Razo of the SCBTG. It will be shown in different municipalities of Sorsogon during festivals, including this year's Gujuban Festival.

Rabies is scary and that can be a problem: Sometimes fear of the disease means people shy away from knowing more. But rabies is preventable and forewarned is forearmed. Rabies Awareness Month is a fantastic vehicle for making sure live saving messages are accessible and engaging.

Submitted by Liz Davidson, World Rabies Day Coordinator, GARC

Philippino Education Students Take the Rabies Educator Certificate (REC)

“After knowing that rabies is a fatal yet preventable disease, I felt the burden and responsibility to share the things I learned from REC,” says Dr. Eva B. Macugay.

Dr. Macugay was one of the participants of the Rabies Educator Certificate (REC) program that was held November 12-13, 2015 at Laoag City, Ilocos Norte. She is a college professor at the Mariano Marcos State University in Laoag City, and teaches biology to education students. After finishing the REC, she conducted an anti-rabies campaign seminar with the help of her students last December 4, 2015. Basic information on rabies and how it can be prevented were the main topics discussed in the seminar. It was attended by 50 college students.

Since education students conduct information campaigns as part of their school activities, they can include rabies awareness as one of their topics. With this, Dr. Macugay and her students, plan to conduct more anti-rabies campaigns, especially in their community. Furthermore, she encourages her students and fellow professors to take the REC because she believes that it is necessary to know about rabies prevention.



Contributed by Eunice Mendoza, GARC Philippines office

Veterinarian Trainers Integrate Rabies Awareness into Community Engagement Studies in South Africa

The University of Pretoria (UP) Onderstepoort Veterinary Faculty has integrated the Rabies Educator Certificate (REC) into the veterinarian-training coursework, including the resource in their community engagement module this year. The community engagement module focuses on rabies education, as well as the issues surrounding organised dog fighting. 174 South African veterinary science students (currently beginning their 3rd year of training) were introduced to rabies for the first time in their studies when GARC was invited to present a guest lecture on community engagement with the specific theme of rabies.

The guest lecture was presented by GARC team members and focussed on the importance of rabies and the various impacts—economic, social and psychological—that rabies has on people and the community. The immediate impact of the lecture was clear when some students asked for advice on suspected rabies cases in their areas, and others spoke about personal experiences, including the tragic death of a family member due to rabies.

The freely available, online educational resources available on the [GARC Education Platform](#) were the primary focus of the lecture, with their implementation and use in communities being stressed as an effective means of disseminating life-saving information regarding rabies and its prevention. Primary animal healthcare, rabies vaccination, bite prevention and the negative impacts of dog culling—both for rabies control and animal welfare—were addressed.

Dr Quixi Sonntag, a lecturer at the UP Onderstepoort Veterinary Faculty, attended the inaugural Pan-African Rabies Control Network (PARACON) meeting in June last year, and after seeing the presentations about the GARC Education Platform—including the REC and the educational booklet *Want a Friend*—expressed keen interest in possible collaborative work between the University of Pretoria and GARC. Subsequent to the PARACON meeting, a flurry of email communications followed, and the UP community engagement coordinator helped the GARC team to organise a school visit on World Rabies Day last year, where 100 educational booklets were distributed by the GARC team to the enthusiastic children. In an effort to engage other children in the community, several hundred booklets will also be distributed by the veterinary students in the various provinces they visit in South Africa as part of their community engagement module.

Through the use of the booklet for children and the REC, communities will become more aware of rabies and its prevention. In addition, the future veterinary professionals of South Africa will be more aware and educated about the importance of rabies prevention. We hope that the interest shown from the students during the lecture will persist into future endeavours to help eliminate canine-mediated human rabies globally by 2030.

Submitted by Terence Scott, GARC and Pan-African Rabies Control Network (PARACON) Steering Committee



Dr. Quixi Sonntag lectures veterinary students at the University of Pretoria about rabies awareness. Photo courtesy of GARC.

GARC Partners with Friedrich-Loeffler-Institut in the Fight against Rabies

At the end of March 2016, GARC signed a memorandum of understanding with the Friedrich-Loeffler-Institut (FLI) in Germany. This MOU promotes the exploration of common interests and opportunities for collaboration as we strive towards the elimination of canine rabies.



FLI has been a member of GARC's Partners for Rabies Prevention since its inception, and this agreement further strengthens the relationship. FLI staff has extensive experience in developing national and international surveillance systems for monitoring rabies and have been actively supporting their development in several canine rabies endemic countries. Their support in improving notification of rabies cases and transparency in data dissemination, in line with international standards, will be most valuable as global efforts step up towards canine rabies elimination. Rabies Experts from FLI have also been integrally involved in the [German government / OIE collaborative project](#) to support the implementation of a National Rabies Control Strategy in Namibia.

GARC and FLI will collaborate to encourage rabies endemic countries to develop and implement regional rabies control and elimination strategies, advocate for more involvement of Ministries of Agriculture and veterinary services in rabies control efforts, and for increased funding from donors to rabies control programmes.

Much of this joint work will be carried out with other partners through regional rabies expert networks such as PARACON, where countries are supported to apply the Stepwise Approach towards Rabies Elimination and the Rabies Blueprint to plan and implement rabies control activities. In particular, FLI will help in the refinement of the [African rabies bulletin database](#), currently under development. At the global level FLI will help to promote World Rabies Day as a focal point for awareness on rabies, and support the End Rabies Now campaign to foster the political support to end human deaths from dog-mediated rabies by 2030.

Contributed by Louise Taylor, GARC

NEWS FROM THE COMMUNITY

Humane Society International's Haryana Project: Exploring Synergies between Rabies Prevention and Dog Population Management

In 2015, following successful rabies vaccination and dog population management (DPM) and rabies vaccination programs in Jaipur, Jamshedpur and several other Indian cities, Humane Society International (HSI) was requested to bid on a DPM project to encompass the entire northern Indian state of Haryana, home to some 25 million people. Although Haryana is a relatively prosperous state, unconfined dogs are commonly seen in towns and villages, and rabies is a significant public health problem. This new initiative followed a decision by the Indian Ministry of Health to increase the prioritization of canine rabies vaccination activities in India, and is consistent with Supreme Court orders issued in 2015 and 2016 that directed states and local bodies to tackle dog population through humane animal birth control protocols. These orders came after repeated reports of dog culling and dog abuse across India.

Recognizing the potential synergies between rabies control and DPM, along with the high cost of rabies post-exposure prophylaxis, the government of Haryana and the Animal Welfare Board of India (AWBI) subsequently entered into an agreement with HSI to implement a program of systematic canine rabies vaccination and humane, sterilization-based DPM across Haryana state.

In preparation for this major undertaking, HSI conducted a scientific dog survey in Haryana in June and October, 2014. The goals of the survey were to:- 1) collect baseline data prior to initiating the program; 2) establish a standardized framework for program impact assessment; and 3) estimate the size of the dog population to assist with strategic and logistical planning for the rabies vaccination and DPM programs. The survey used a stratified-random sampling plan that distinguished between 21 geographical districts and five human population density categories, and drew random samples from within each unique combination of district and human density. The sampled areas consisted of 1 km² plots, of which 209 were ultimately surveyed.

In addition to counting dogs in these plots, several attributes were recorded for each dog, including sex, age, health status, reproductive status and whether the dog was free to roam or confined. HSI also conducted household surveys in many of these plots to generate a population size estimate for owned dogs and to obtain information on human attitudes and practices

Continued on page 8...



HSI staff approach a dog in the street Photo: Hisar Dog Population Management Program

Tracking of Progress against NTDs Could More Accurately Reflect the Burden of Rabies

The United Nations (UN) formally adopted the Sustainable Development Goals (SDGs) in September 2015, pledging to “leave no one behind” by supporting 17 ambitious objectives to end world poverty. Work is currently underway to achieve these goals, but how will the UN monitor progress towards achievement of these goals?



The UN Statistical Commission has mobilized a task force to develop a set of global indicators—or quantifiable markers—that can track the progress towards each goal. [The Commission approved](#) 230 global indicators for all the SDGs in mid-March during its 47th session, a move that will require an unprecedented amount of data to be produced and analyzed.

Progress towards SDG health target 3.3 “By 2030, end the epidemics of AIDS, TB, malaria and neglected tropical diseases (NTDs) and combat hepatitis, water-borne diseases and other communicable diseases”, includes one indicator for all NTDs.

In keeping with the SDGs’ approach of working across silos and ‘leaving no one behind’, the indicator has been chosen so that it can include as many different NTDs as possible. It measures the “Number of people requiring treatment as a tracer for interventions against any one of the NTDs targeted by WHO” and treatment is broadly defined to allow for preventive, curative, surgical or rehabilitative treatment.

For rabies, the best fit for the “number of people requiring treatment” would be the number of people with exposure to relevant dog or animal bites (ie. the number of people requiring PEP). This is a different approach than the traditional measure of rabies’ impact through the number of deaths, and could more accurately reflect the health system burden of the disease. Whilst rabies remains a risk, it is impossible to know which patients would go on to develop the fatal disease, and therefore all bites from possibly rabid dogs must receive appropriate and timely PEP. In the [PRP’s burden study](#) published last year, global deaths from canine rabies were estimated at 59,000 per year, but it was estimated that over 29 million people receive PEP every year globally, saving just under 3 million lives.

It remains to be seen how the burden of rabies measured by the need for PEP, compares to the burden of other NTDs, such as parasitic worm infections where drugs are often delivered universally to children in affected areas. The paper suggests that disaggregation of the NTD indicator by intervention (preventive, curative, etc.) and disease is, therefore, needed to monitor progress towards the end of all NTDs and, ultimately, tell a more nuanced story of successes and failures.

Data on numbers of people receiving preventive chemotherapy against NTDs are already collected from programme reporting forms for donated medicines and collated in the WHO’s [integrated NTD database](#). The WHO’s Global Health Observatory (GHO) will soon include rabies data and will continue to collect the most accurate data available on the numbers of human deaths due to each cause.

Deaths due to rabies could be used as part of the SDG indicator whilst acknowledging that these are only a subset of the total number of people that would have required PEP. However, in order to contribute the most accurate picture of the impact of rabies, more accurate reporting of bite patient numbers and PEP deliveries will be needed, and there is scope to include these in the GHO too.

The interconnectedness of the different SDG targets, is particularly relevant for NTDs which are linked to poverty and inequality. For example, target 3.8 calls for ‘access to quality essential healthcare services and access to safe, effective, quality and affordable essential medicines and vaccines for all’ and the paper suggests that the presence, or absence, of NTDs can be seen as a ‘tracers’ for poverty and the success of interventions aimed to reduce it. Tracers for target 3.8 include preventative chemotherapy for NTDs, alongside antiretroviral therapy, TB treatment and insecticide-treated bed net use. There may be scope to consider dog vaccination or PEP coverage in a similar way, as the NTD tracer could be broadened to monitor the coverage with a basic package of NTD interventions—which is as yet undefined.

Contributed by Laura Baker and Louise Taylor of GARC, and Anna Fahrion from the WHO Department of Control of NTD. Information was taken from the recent publication “[Leaving no one behind: a neglected tropical disease indicator and tracers for the Sustainable Development Goals](#)” in International Health and the announcement: “[UN statistical body agrees to global indicators to measure sustainable development goals](#)” in the UN News Centre.

Award-winning Mobile Phone App Boosts Rabies-Control Efforts in Tanzania

A few years ago, former University of Glasgow PhD researcher Zac Mtema developed an application for rabies monitoring that could run on the most basic mobile phone handsets. (Less than 5% of health workers in Tanzania own a smart phone.) This app lets health workers record information on patients with animal bites and their treatment using a simple form on the phone, while veterinary workers can submit records on outbreaks and dog vaccinations. This work was recently awarded the Guardian University Award in the International Projects category. All this information goes to a website that is accessed by government staff. It lets them see where dog bites are occurring, where vaccine stocks are running low, and where not enough dogs have been vaccinated. Equally important, it lets two sets of workers share information in real time in a place where typically lines of communication between sectors are weak.



Surveillance records in a Tanzanian medical office. Photo courtesy of Katie Hampson.

In low-income countries in Africa, vaccines are often out of stock in rural clinics. The problem is not a lack of vaccines per se, but a supply chain that is not responsive to demand because there are no electronic records and monitoring systems are virtually non-existent. The information available to the authorities tends to reveal only the tip of the iceberg. And this is not just a problem for rabies vaccines, but for essential medical supplies in general.

Mobile phones look like the answer to this information problem. Over 97% of Tanzanians now have access to a mobile phone. While most clinics do not have a computer, every health worker has a mobile.

We have just reached the end of a five-year trial of this mobile-phone reporting system in southern Tanzania that involved over 300 health and veterinary workers submitting over 30,000 records across an area home to several million people. The mobile phone app has supported a WHO-funded rabies control programme, in which the government has been aiming to vaccinate at least 70% of dogs in the 2,000-plus villages across the region every year since 2011. This is part of a global push to eliminate human deaths from rabies by 2030.

Our results have been very encouraging. Patients reporting to clinics with dog bites have halved over the past five years, and rabies has disappeared entirely from Pemba, a Tanzanian island with a population of over 400,000. Admittedly, it is much easier to eliminate rabies from an island with a small dog population, but the trajectories across the pilot area are promising, too. Dr Chibonda, the director of a rural medical clinic, used to see bite patients almost every day, but now he sees just one or two a month; and when previously he didn't even know the veterinary officer in his community, now they call one another and even carry out joint outbreak investigations.

The system may not solve the problem of chronic underfunding, but it helps make the most of the resources available. The fact that the handsets are so familiar and easy to use is almost certainly one of the reasons why it has taken off.

Our rabies-monitoring programme is an example of "mhealth"—using mobile phones for healthcare. It's a promising and rapidly growing area, though there are few examples of programmes of this scope and scale. The Tanzanian government has adopted our application as a pilot in the region for rabies prevention. We hope it will be rolled out across Tanzania, where the disease remains rampant. Elsewhere in the country, the mobile phone app has already been adapted for other uses including monitoring pregnancies and birth complications, as well as for malaria control.

The more that cheap, easy-to-use, and familiar tools such as ours can become standard practice to support health workers, the better equipped they will be to deal with the entrenched disease problems of today—and for epidemics in the future.



Zac Mtema training a healthworker to use the application. Photo courtesy of Katie Hampson.

Submitted by Katie Hampson, University of Glasgow rabies researcher. Excerpted from a recently published report by the author in *The Conversation*, "[A new weapon in the war on rabies: mobile phones](#)". There is more information about the award available [here](#). This work was published in *PLoS Medicine*, "[Mobile phones as surveillance tools: Implementing and evaluating a large-scale intersectoral surveillance system for rabies in Tanzania](#)".

...*Haryana Project* continued from page 5.

as they relate to dog welfare and human safety. After correcting data for incomplete dog detection and survey coverage, HSI extrapolated data across Haryana and estimated a total population of approximately 1.9 million free-roaming dogs, or about 7.5 free-roaming dogs/100 people. About half of these dogs are owned and half are not. In addition, an estimated 660,000 owned dogs are confined to their owner’s property. The total dog population is around 2.5 million (or 10 dogs per 100 people). There was a clear inverse relationship between human density and dog numbers with urban areas having around 2 dogs and rural communities having more than 10 dogs per 100 people.

Program implementation began in August, 2015 with about 90 ground staff aiming initially to vaccinate 1,000 -1,200 dogs/day and sterilize approximately 250 dogs/day. By March 2017, the implementation plan called for HSI to achieve and confirm a rabies vaccination rate of at least 70% in five targeted districts in the Hisar Division (out of 21 districts in Haryana). As of May 31, 2016, the one-year anniversary of the program, 18,550 dogs, approximately equal numbers of males and females, had been sterilized and vaccinated by the DPM unit, and an additional 74,014 dogs had been vaccinated by the Mass Dog Vaccination unit. Although the primary goal of this program is effective rabies control, HSI also seeks to improve the standards for animal health and welfare, to foster a better relationship between people and dogs, and to explore the benefits of sterilization-based DPM from the perspective of rabies control. Toward that end, sterilizations are being performed in selected areas to investigate how rabies control may benefit as a result of humane DPM. “The synergies between rabies control and humane dog population management are a critical new area of interest”, says Dr Andrew Rowan, the HSI CEO. “By taking this more holistic approach, we believe we can achieve both our public health goals and our animal welfare goals more effectively and efficiently. Ultimately, we hope that this program not only benefits Haryana, but serves as a broadly-applicable model for integrating rabies control and humane dog management at a large scale”.



*HSI staff and people waiting with their dogs for vaccination
Photo: Hisar Dog Population Management Program*

Contributed by Amit Chaudhary B.V.Sc., Senior Manager of Monitoring, Evaluation and Impact Assessment, Humane Society International (Asia); John Boone Ph.D., Consultant, Humane Society International; and Joann Lindenmayer D.V.M., M.P.H., Senior Manager of Disaster Operations, Humane Society International. Further information about the [project’s launch](#) and [recent progress](#) can be found on the HSI website.

Why, When, and How Should Rabies Be Diagnosed?

[A recent open access review paper](#) by Veasna Duong and colleagues summarises the different techniques available for the laboratory diagnosis of rabies in animals and humans and goes on to recommend how these techniques should be applied in a variety of settings to best inform rabies control efforts. Because laboratory diagnostic capacity is often a crucial bottleneck to implementing and monitoring community-based elimination intervention programs, the review’s information should be very useful to rabies control program managers.

Evidence of infection with the rabies virus can be detected directly by culturing the virus, detecting its RNA, detecting its antigens, or indirectly by detecting antibodies raised against it by the host’s immune system. Several diagnostic techniques within each category exist, and the paper briefly reviews the advantages and challenges of each, along with the type and quality of samples that can be analysed.

Genetic analysis of viral RNA can help identify the virus’ origin, but this method requires skilled laboratory staff with reliable supplies of reagents and stable infrastructure such as constant cold storage. Whilst the direct fluorescent antibody test (FAT) remains the only recommended technique for routine use in national reference laboratories, in more remote settings the direct rapid immunohistochemical test (DRIT) might be a good fit, so long as a reliable source of antibodies is available. Although highly promising and simple, lateral flow tests are currently not recommended for routine diagnosis by OIE or WHO because of their variable properties and the need for further validation. The lateral flow tests do, however, have a role to play in research or where sample transportation to more central facilities is difficult.

Techniques for taking samples from suspected cases, analysing samples of poor quality, and taking both ante- and post-mortem human samples without the need for removal of the brain are also reviewed.

In non-endemic settings, any suspected case of rabies in human or animals should be investigated thoroughly to determine the origin of the infection and quickly identify rabies re-emergence, to guide outbreak responses, and inform patient management.

Ideally in canine rabies endemic settings, laboratory confirmation would be carried out routinely on the brains from suspected rabid animals to ensure that post-exposure prophylaxis (PEP) is supplied as necessary. Human case laboratory diagnosis is extremely valuable where the biting animal is not available for testing, for non-typical (e.g., paralytic) rabies encephalitis cases,

Continued on page 9...

Vaccination Campaign Protects Tigers from Dog-Transmitted Rabies

Officials at the Panna Tiger Reserve in Madhya Pradesh (northeast India) have vaccinated hundreds of stray and local dogs near the park's perimeter to protect its resident big cat population from deadly canine-transmitted diseases including rabies. The vaccination campaign was carried out in late December 2015, and over 600 dogs, mostly unowned and living near 13 villages proximal to the park, were captured, vaccinated, and then later released. In addition, each captured dog underwent a blood draw to confirm the presence of current or past infections, and all newly vaccinated dogs were marked with an identity collar to indicate their updated vaccination status.

By vaccinating all dogs—owned and stray—in a 5-km-wide margin all around the park's perimeter, officials hope they have created a rabies-free zone that provides tigers a buffer from unvaccinated animals, protecting the resident felines from the possibility of contracting a canine-transmitted disease. The big cats at Panna, like those at most Indian tiger reserves, are not restricted from moving outside the boundaries of the park; and there are no fences to mark the perimeter, permitting wildlife and other animals living proximal to the park to roam freely inside the tigers' habitat. Unvaccinated dogs living in the perimeter place tigers at risk for rabies and other diseases such as canine distemper and parvo, all viruses that can be passed from canine to feline with deadly effects.

Recent incidents where local dogs have attacked tigers have raised concerns amongst park officials about the potential of the local unvaccinated dog population to spread disease to the park's tigers and have spurred similar campaigns in other tiger reserves in India.

In 2013, a dog—later confirmed to have rabies—attacked and bit one of Panna's male tigers. The tiger survived after treatment with an anti-rabies vaccine, but the attack highlighted the vulnerability of the reserve to infiltration by rabid or infectious animals and exposure to deadly diseases.

Recently in 2015, one of Panna's tigresses died suddenly from the highly contagious canine distemper virus. Park veterinarians identified the female as one that roamed the park's perimeter and suspected that the tiger was poaching local dogs to supplement her diet. It was surmised that consumption of infected dog meat may have led to the transmission of the virus and the cat's subsequent death. In response to the loss of the tigress, officials conducted blood tests on all other tigers in the park for distemper, as well as initiated the current inoculation strategy that has targeted all local dogs.

Other tiger reserves in India are following suit and taking similar measures to protect their big cats from canine-transmitted diseases. The Humane Society International (HSI) recently conducted a dog population survey and found that there were over 17,000 dogs living in the 5 km buffer zone near Jim Corbett National Park, a wildlife sanctuary also located in northeastern India. Of these, over 13,000 dogs were found to be unvaccinated.

"The majority of the dogs in this buffer zone are either owned by the villagers or are in their care. There are innumerable instances wherein the dogs are snatched away at night by big cats. Largely unaware of these infections and the available vaccinations for it, the villagers have not given vaccinations to these dogs," said Amit Chaudhari who led the HSI team in an interview with The Times of India.

The results of the completed HSI survey indicate that all dogs in the buffer zone should be vaccinated immediately and have prompted HSI to prepare a proposal on how to implement a similar vaccination campaign at other tiger reserves in India. The proposal is currently under review with India's National Tiger Conservation Authority.

Submitted by Laura Baker, GARC, based on reports in The Indian Express, "[Madhya Pradesh: Dogs get shots to save Panna tigers](#)," and "[3-yr-old Panna tiger under watch after rabid dog bites its tail](#)," in The Hindustani Times, "[Dogs threatening tigers in MP's Panna reserve](#)," and in The Times of India, "[17,000 dogs in Corbett a big threat to its big cats](#)."



*Bengal Tiger in Nagzira Wildlife Sanctuary, India
Photo from Wikimedia, by Vijay Phulwadhawa
(Own work)*

...Rabies Diagnosis continued from page 8.

and for apparent PEP failures. However, in most settings with high case loads, a diagnosis of "probable rabies" in humans can routinely rely on the occurrence of a bite from a potentially rabid animal and clinical signs in the patient.

Without laboratory confirmation, it is impossible to be sure of the true burden of rabies in a country and to advocate for more resources to control it. As control efforts start to have their impact, more widespread use of rabies diagnostics can inform the refinement of control approaches, and the diagnostic strategy should evolve towards that of a non-endemic area as elimination of the virus is approached.

Summarised by Louise Taylor from the paper "[Laboratory diagnostics in dog-mediated rabies—an overview of performance and a proposed strategy for various settings](#)," by Duong, et al. (2016) published in International Journal of Infectious Diseases.

Soccer Match in Angola Scores a Big Win for Rabies Awareness

Eu Cuido (I Care) was the name given to a rabies-awareness event that the association Friends of Animals and the Environment, also known as Angola Rescue, organized on 9 January at the Coqueiro Stadium in Luanda, Angola.

At the first soccer match of the year in Angola, [Angola Rescue](#) was able to gather together more than 50 famous artists and public figures to participate in the soccer match and to help educate attendees about animal health and rabies. However, the true heroes that day were the animals.



Photo courtesy of Angola Rescue.

The Cavalry and Canine Training Command of the national police was an important partner in this event, which was attended by more than 4,000 people, amongst them schools, associations and civilians interested in knowing more about how to prevent and combat rabies.

A parade with National Police cavalry and a series of exercises demonstrating skills by the canine brigade further brightened the soccer match where artists, public figures and soccer players literally shared the field with dogs, which were in the field participating in the match and even scoring goals.

Public figures had the opportunity to parade with their pets on a specially created catwalk. The winners were awarded prizes for their animals.

Snacks, water, juice, caps and T-shirts were donated to the spectators. On this day full of love, there was a will to learn more about how to understand animals and prevent and combat rabies. Angola Rescue shared information about the care and health of animals including communicable diseases, vaccinations and responsible ownership.

Besides the direct objective of teaching more about rabies and demystifying the false idea that all street animals have rabies, this event also served to introduce Angola Rescue to the community and to recruit more volunteers to its cause.

The rescue of animals on the streets, their clinical treatment, and their follow-up until adoption are processes that require hands-on intervention. The more volunteers there are, the greater the probability of success that Angola will have in the national fight against rabies.

Public and private entities believed in the project, identified themselves with it, and participated in the event, appreciating the effort that Angola Rescue has made towards this greater objective.

Many positive results appeared from this event that allowed Angola Rescue to begin to think about reapplying itself, in a more realistic manner, to the various municipalities in the country.

The support and sponsorships obtained—at the governmental and at the private level—were essential to this event's success, a success that was not only for Angola Rescue, but for Angola and Angolans.

At this time, Angola Rescue feels that activities with schools and associations in communities will provide the best chance to work towards their global objective.

To help serve this purpose, a series of supporting documents are being prepared and distributed free of charge. These documents, some of them adapted from international institutions, such as GARC's "Want a Friend, Be a Friend" booklet and others developed by Angola Rescue, will be fundamental tools to combat and prevent rabies.



The Cavalry and Canine Training Command of Angola's national police marches with the canine brigade. Photo courtesy of GARC.

Submitted by Fátima Pires on behalf of the Angola Rescue team in Luanda, Republic of Angola in southern Africa. For more information on Angola Rescue visit www.luanda.rescue.com. Read more about the event on [Angola Rescue's Facebook page](#) and in the [news story](#) (in Portuguese) in *Semanário Económico*.

Translated from the original Portuguese by Translators without Borders



Recent Research *A summary of recent research most relevant to GARC’s mission.*

PEP

[Reducing Cost of Rabies Post Exposure Prophylaxis: Experience of a Tertiary Care Hospital in Pakistan.](#) Between July 2013- June 2014, 2983 bite patients were assessed and 97% given PEP (free to the patients). The cost, per patient, of providing vaccine alone via the intradermal (ID) route was PKR 570.8 (USD 5.70) and for providing Equine RIG, PKR 1138.0 (USD11.38). The use of the ID regimen was estimated to have cost only 1/5th of the customary 5-dose Essen intramuscular regimen.

[Development of broad-spectrum human monoclonal antibodies for rabies post-exposure prophylaxis.](#) Two broadly neutralizing human monoclonal antibodies (RVC20 and RVC58) were identified as a valid and affordable alternative to RIG. The two bind to different antigenic sites, and were found to neutralize all of 35 rabies virus (RABV) and 25 non-RABV lyssaviruses tested, showing higher potency and breadth than antibodies under clinical development and commercially available human RIG. In vivo, the RVC20-RVC58 cocktail protected Syrian hamsters from a lethal RABV challenge and did not affect the endogenous hamster post-vaccination antibody response.

Dog rabies control

[Towards Canine Rabies Elimination in South-Eastern Tanzania: Assessment of Health Economic Data.](#) The total cost per dog vaccinated ranged from \$2.50 to \$22.49 across districts and phases, with the cost per phase falling from \$11.27 to \$7.30 as efficiencies improved. The cost per human PEP course administered was approximately \$24.41, with the average patient receiving 2.5 of the recommended four vaccine doses.

[Intention of dog owners to participate in rabies control measures in Flores Island, Indonesia.](#) 96% of dog owners intended to participate in a free vaccination campaign, but only 24% if they were asked to pay a vaccination fee. 81% of the dog owners intended to keep their dogs inside or to leash them if there was rabies within their village and only 40% intended to cull their dogs if this occurred. Analysis suggested useful guidance – such as education focusing on the benefits of rabies control, training on how to confine dogs, holding campaigns at weekends and creating a subsidy program for the vaccine and leash costs – that could benefit control efforts.

[Size and demography pattern of the domestic dog population in Bhutan: Implications for dog population management and disease control.](#) Cross-sectional household surveys and mark-resight surveys were conducted to estimate dog population sizes. The dog: human ratio was 1:16.30 (urban areas) and 1:8.43 (rural areas). The total owned dog population estimated based on the mean number of dogs per household was 65,312 and based on dogs per person was 71,245 in the country. The stray dog population was estimated to be 48,379, and in the two border towns 31% of dogs were found free-roaming.

[Willingness to Pay for Dog Rabies Vaccine and Registration in Ilocos Norte, Philippines \(2012\).](#) Eighty-six per cent of Ilocos Norte residents were willing to pay 69.65 Philippine Pesos (PHP) (1.67 USD) for dog vaccination and 29.13PHP (0.70 USD) for dog registration each year. Willingness to pay was influenced by demographic and knowledge factors, such as income, participants’ willingness to commit to pay each year, municipality, knowledge of the signs of rabies in dogs, and number of dogs owed.

Awareness and Education

[Dog Demography, Animal Bite Management and Rabies Knowledge-Attitude and Practices in the Awash Basin, Eastern Ethiopia.](#) A survey of over 500 respondents from urban, pastoralists and medical personnel communities. No bite wound records were kept in medical facilities, where staff recalled around 100 bites per year. Over 90% of the respondents knew about rabies but not all knew the symptoms, and most pastoralists did not know how dogs acquired the disease, or that it was fatal if untreated in people. Over half of pastoralists visit traditional healers if bitten, despite a health extension worker program in place in the study area.

[Community Health Seeking Behavior for Suspected Human and Animal Rabies Cases, Gomma District, Southwest Ethiopia.](#) The majority of the respondents would seek treatment from modern health care facilities for human rabies exposures. However, a significant number had inappropriately managed domestic animals with rabies, including slaughtering them for human consumption, selling them immediately, visiting a traditional healer, caring for them at home, or doing nothing.

Continued on page 12...

...Recent Research continued from page 11.

Diagnostics

[Laboratory diagnostics in dog-mediated rabies-an overview of performance and a proposed strategy for various settings](#). A review of benefits and drawbacks of different available diagnostic assays for rabies with suggested policies for their use in different endemic settings.

[Retrospective diagnosis of two rabies cases in humans by high throughput sequencing](#). A broad-range polymerase chain reaction analysis followed by high throughput sequencing were used to diagnose rabies in two patients who died of encephalitis of unknown origin in Russia in 2003. The entire genome of each strain was sequenced, [Comparison of rapid immunodiagnosis assay kit with molecular and immunopathological approaches for diagnosis of rabies in cattle](#). Brain samples from suspected rabid cattle were screened by the FAT, Heminested RT-PCR, Immunohistochemistry (IHC), and a new rapid immunodiagnostic assay (RIDA). Despite a comparatively low-sensitivity (85.7%) and accuracy (91.6%) of RIDA, it can still be useful in screening a large number of field samples promptly. However, negative results with RIDA in cattle need to be authenticated with suitable alternative diagnostic approaches.

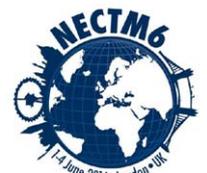
Epidemiology

[Revealing the Micro-scale Signature of Endemic Zoonotic Disease Transmission in an African Urban Setting](#). Detailed epidemiological time series and viral sequence data from more than 20 years from Bangui, the capital of Central African Republic was used in mathematical models and phylogenetic analyses. Although dog rabies appears to be endemic in Bangui, in fact local chains of transmission regularly go extinct, but there are frequent introductions of new lineages. Thus rabies is not self-sustaining in Bangui, but driven by human-mediated spread of virus. Control measures should target areas neighbouring the city that are the source of frequent incursions in Bangui.

[Rabies transmission risks during peripartum - Two cases and a review of the literature](#). Babies of two mothers with probable rabies at or near the end of pregnancy did not contract rabies after receiving PEP. A literature review revealed 14 other published cases of infants born from rabid mothers, one of which had confirmed rabies. Mother-to-child transmission of rabies is possible, but rare, since exposure of the baby's mucosa to maternal infectious fluids and tissue seems limited. Babies should be given rabies PEP, including RIG, as soon as possible. Rabies cell-culture vaccines are safe and effective and can be administered to pregnant and lactating women, as well as newborns.

Upcoming Conferences

The 6th Northern European Conference on Travel Medicine (NECTM6) will be held in London, 1-4 June 2016. For more details go to [their website](#).



APCRICON 2016, the 18th Annual National Conference of the Association for the Prevention and Control of Rabies in India will be held on 9th & 10th July in Bengluru. More details soon at [rabies.org.in](#).

The 4th Antivirals Congress 2016 will be held from 18-21 September 2016, in Sitges, Barcelona, Spain. More information is available [here](#).

The 41st World Small Animal Veterinary Association Congress is taking place September 27-30, 2016 in Cartagena, Colombia. See [the website](#) for further details.

The XXVII Rabies in the Americas meeting will be held in Belem Brazil from 23-28th October. The website will be available soon.

The **2nd GLOBAL CONFERENCE ON ONE HEALTH** - Moving forward from One Health Concept to One Health Approach. Will be held in Kitakyushu City, Japan from Nov 10th to 11th

One Health EcoHealth 2016, to bring together the global One Health and EcoHealth communities, will meet in Melbourne, Australia, from December 4th to 7th.

The editors of the GARC newsletter are Louise Taylor and Laura Baker, typesetting is by Pete Else. Contribute stories to louise.taylor@rabiesalliance.org. For further information on the Alliance's work see www.rabiesalliance.org.