

## Partnership to improve antimicrobial treatment and stewardship for infections in pregnancy in Papua New Guinea



Figure 1: Mini laboratory set-up at a health facility in Papua New Guinea.

### Context

The World Health Organization (WHO) classifies *Neisseria gonorrhoeae* as a high priority for antimicrobial resistance research and development.<sup>1</sup> WHO estimates that there are about 78 million new cases of the sexually transmitted infection (STI) gonorrhoea every year.<sup>2</sup> Surveillance is essential to guide rational treatment and monitor the emergence and spread of antimicrobial resistant gonorrhoea strains,<sup>3</sup> but more than 95% of gonorrhoea infections occur in low- and middle-income countries, where resources to monitor antimicrobial resistance are poorest. The last remaining antimicrobial recommended for empirical treatment of gonorrhoea is ceftriaxone, which is given by injection. If resistance to ceftriaxone spreads widely, gonorrhoea could become untreatable. The complications of gonorrhoea, which include pelvic inflammatory disease, tubal infertility, ectopic pregnancy, and mother to child transmission, will then become much more common.

Papua New Guinea (PNG), in the Pacific region, has a population of approximately 7 million. PNG has high levels of ill health; maternal mortality rate (220 per 100,000 live births) is amongst the highest in the world.<sup>4</sup> STI rates are also amongst the highest in the world; amongst pregnant women, 14% (95% confidence intervals, CI 12-17%) have gonorrhoea,<sup>5</sup> compared with the WHO regional estimate of 1.2% (uncertainty interval 0.8-1.7%).<sup>2</sup> There is no up-to-date information about antimicrobial resistant gonorrhoea in PNG. PNG last contributed to the WHO Western Pacific Regional Gonococcal Antimicrobial Surveillance Programme (GASP) in 2006, when 43% of strains were resistant to penicillin and 2%



resistant to ciprofloxacin<sup>6</sup>. Since then, resistance to ciprofloxacin has exceeded 30% in all neighbouring countries that have contributed to GASP from 2011-2014.<sup>3</sup>

PNG's human development index ranks 154<sup>th</sup> of 188 countries.<sup>7</sup> Healthcare is mostly provided at government or church facilities funded by tax revenues, donor funds and out-of-pocket payments. A 2012 assessment, based on the WHO Health Systems Framework, found increasing health expenditure (USD50 per capita), but also increasing user fees.<sup>8</sup> Most healthcare is delivered by provincial and local government services, but staffing levels are low and essential drugs are unavailable approximately half the time.<sup>8</sup> Microbiology laboratory capacity and resources in PNG are poor and monitoring of antimicrobial resistance is sporadic.

### **Project description**

We plan to conduct a needs assessment from which we will develop a proposal for an ESTHER partnership project. The start-up grant will allow us to collate information from different source and stakeholders in PNG, and at Modilon Hospital in particular, according to the building blocks of the WHO Health Systems Framework. We will collect information from published and unpublished literature, assessment of the clinical and laboratory capacity for bacterial culture and antimicrobial susceptibility testing, assessment of the views and skills of obstetric nursing and medical staff around infection control and antimicrobial resistance, and of the hospital infrastructure for provision of medicines and diagnostics. We will synthesise the data collected to develop a partnership project that will address health service management and delivery in a way that contributes to the wider goals of achieving sustainable development.

### **Partnership**

A partnership between the Institute of Social and Preventive Medicine (ISPM) at the University of Bern and Modilon Hospital in Madang, PNG will improve health care and health outcomes in several ways. First, information about antimicrobial resistance in gonorrhoea will allow us to update STI treatment guidelines. These treatment guidelines will benefit the population by improving treatment effectiveness and reducing treatment failures, which will reduce vertical transmission from mothers to newborns. Second, information about infection control practices for infections in pregnancy and the post-natal period will reveal needs for improved infection control and antimicrobial stewardship. Third, developing nursing and medical staff skills for the regular collection of data for clinical audit will improve the implementation and monitoring of quality improvement activities.

The planned partnership will build on existing links with the Papua New Guinea Institute of Medical Research (PNGIMR) through a collaboration to improve maternal and infant health outcomes. Dr. Andrew Vallely and Dr. William Pomat (PNGIMR) are leading a clinical trial called WANTAIM (Women And Newborn Trial of Antenatal Interventions and Management). The trial is evaluating the effects of screening in pregnancy for STI using rapid diagnostic tests on the incidence of preterm birth, low birthweight and neonatal infections. Prof. Nicola Low at the University of Bern is a co-investigator and the Swiss Programme for research on global issues for development (r4d) is supporting the WANTAIM trial component that focuses on infant outcomes and on community engagement and dissemination. An ESTHER partnership project would give both partners the opportunity to strengthen their collaboration, to make the links between Switzerland and PNG sustainable, and to promote the training and development of clinical and laboratory staff to improve health service delivery for STI.



Improvements in the treatment and management of infections in pregnancy should contribute to a reduction in complications including preterm birth, puerperal sepsis and ophthalmia neonatorum. Reductions in these adverse outcomes will contribute to the United Nations' Sustainable Development Goal (SDG) 3 (ensuring healthy lives and promoting well-being for all at all ages). These activities will directly impact SDG target 3.7 (ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes), 3.C (increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States and 3.D (strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks).<sup>9</sup>

### Timeframe

March 2018 to August 2018

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### References

1. World Health Organization. Global priority list of antibiotic-resistant bacteria to guide research, discovery, and development of new antibiotics. Geneva: World Health Organization, 2017:1-7.
2. Newman L, Rowley J, Vander Hoorn S, et al. Global Estimates of the Prevalence and Incidence of Four Curable Sexually Transmitted Infections in 2012 Based on Systematic Review and Global Reporting. *PLoS one* 2015;10(12):e0143304.
3. Wi T, Lahra MM, Ndowa F, et al. Antimicrobial resistance in *Neisseria gonorrhoeae*: Global surveillance and a call for international collaborative action. *PLoS Med* 2017;14(7):e1002344.
4. World Health Organization, Papua New Guinea: WHO statistical profile. <<http://www.who.int/gho/countries/png.pdf?ua=1>> (accessed 08 January 2018).
5. Vallely LM, Toliman P, Ryan C, et al. Prevalence and risk factors of *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Trichomonas vaginalis* and other sexually transmissible infections among women attending antenatal clinics in three provinces in Papua New Guinea: a cross-sectional survey. *Sex Health* 2016;13(5):420-27.



6. WHO Western Pacific Gonococccal Antimicrobial Surveillance Programme. Surveillance of antibiotic resistance in *Neisseria gonorrhoeae* in the WHO Western Pacific Region, 2006. *Commun Dis Intell Q Rep* 2008;32(1):48-51.
7. United Nations Development Programme, Table 1: Human Development Index and its components <<http://hdr.undp.org/en/composite/HDI>> (accessed 15 January 2018).
8. World Health Organization, Papua New Guinea National Department of Health. Health Service Delivery Profile, Papua New Guinea 2012, 2012:1-12.
9. United Nations, Sustainable Development Goal 3. <<https://sustainabledevelopment.un.org/sdg3>> (accessed 15 January 2018).