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Improving Women's Reproductive Health *(WORTH)* A strategic partnership between Kilimanjaro Christian Medical Centre, Odense University Hospital and University of Southern Denmark

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Vision

Tanzanian women suffer disproportionately from reproductive health problems illustrated by the fact that a Tanzanian mother has an almost 100 times increased risk of dying from delivery complications compared with a Danish mother. However maternal deaths only represent the tip of the iceberg. For every woman who dies, a significant number face grim and long-lasting consequences including pelvic floor disorders such as obstetric fistula, urinary incontinence and pelvic organ prolapse. Tanzanian women are additionally suffering disproportional from premature deaths due to cervical cancer. Recently many public health initiatives as e.g. Doctors Without Borders, have emphasized the importance of clinical and surgical training, stressing that countless lives could be saved and quality of life improved if only local doctors had the advantage of learning clinical and surgical skills and how to apply them in their own settings. This does also apply for Tanzania where skills of human resources has emerged as perhaps the single most important barrier to achieving universal access to reproductive health service. Against this background we propose a joint collaboration between the obstetrical and gynaecological departments at Kilimanjaro Christian Medical Centre (KCMC), Tanzania and Odense University Hospital (OUH), Denmark with the overall aim to improve Tanzanian women's reproductive health. This will be achieved through advancement of clinical skills among obstetricians and gynaecologists working at KCMC within selected focus areas. The proposed *Women's Reproductive Health (WORTH)* project will focus on three common reproductive health problems among Tanzanian women: Quality emergency obstetric and neonatal care (EmONC), Pelvic floor disorders and Cervical cancer. The mentioned problems share in common that they have i) a significant negative impact on women health ii) there is a documented need of upgrading skills of health workers to handle these health problems and iii) high expertise in diagnosing and treating these health problems are available at OUH. The project will additionally give priority to enhancing research capacity with a special view to pelvic floor disorders. This part of the project will be conducted as a joint collaboration between KCMC and University of Southern Denmark (SDU). Both KCMC and SDU are believed to benefit from the research activities, which will help attune health professionals in both countries to better address the health challenges which globalisation brings around.

Introduction and background

The problem

Global inequities in human health are widespread and unequal access to reproductive health service is an immense problem which especially affects poor women who are living in underprivileged societies. Hence, 99% of maternal deaths occur in developing countries and sexual and reproductive health conditions account for nearly two-thirds of disability-adjusted life years (DALYs) lost among women of reproductive age in Sub-Saharan Africa, compared with about one-third worldwide (WHO 2012, AGI 2004). Additionally, many low income countries are also facing problems with weak health systems as well as societal, gender-based and environmental barriers to health. Hence impoverished women suffer disproportionately from maternal death, maternal morbidity and other problems related to their reproductive system. Maternal health has a high priority on the global agenda most prominently underlined in the Millennium Development Goals (UN 2012) and investment in reproductive health services in developing countries is

considered to be associated with tremendous benefits to women and their families (UNFPA 2010). Additionally, it is increasingly acknowledged that a woman's right to survive childbirth without suffering from long-lasting consequences entitles her to access to appropriate health services and that legislation obstructing such access violates international human rights provisions (Babtiste et al 2010). Against this background we propose a joint collaboration between the obstetrical and gynaecological departments at Kilimanjaro Christian Medical Centre (KCMC), Tanzania and Odense University Hospital (OUH), Denmark with the overall aim to improve Tanzanian women's reproductive health. This will be achieved through advancement of clinical skills and research skills among obstetricians and gynaecologists working at KCMC within selected focus areas. The proposed *Women's Reproductive Health (WORTH)* project will focus on three common reproductive health problems among Tanzanian women: Quality emergency obstetric and neonatal care (EmONC), Pelvic floor disorders and Cervical cancer. The mentioned problems share in common that they have i) a significant negative impact on women health ii) there is a documented need of upgrading skills of health workers to handle these health problems and iii) high expertise in diagnosing and treating these health problems are available at OUH.

Selected focus areas

Quality emergency obstetric and neonatal care

Maternal mortality was until recently not reduced even though many promises have been made to do so, latest stated in the Millennium Development Goals where goal number 5 is to reduce maternal mortality by 75% in 2015 compared to 1990 (UN 2012). As the majority of maternal deaths happen around or are related to the birth, the main strategy to reduce maternal mortality is to have 90% of all births assisted by a "skilled birth attendant" in a health facility. However, a "health facility" birth is by no means necessarily the same as a "safe birth", and the lack of skills of the skilled birth attendants necessary to perform lifesaving procedures for mothers has been highlighted as a key point of intervention (UNFPA 2011).

Tanzania has free maternal health services and almost two thirds of deliveries take place at health facilities, nevertheless it is one of the ten countries in the world with the highest number of maternal deaths. We have previously shown that the quality of maternal health care at the village health facilities is alarmingly low due to shortage of drugs, equipment and staff (Sorensen et al 2011a). We have additionally documented that the vast majority of maternal deaths happens at health facility level (Sorensen et al 2010). An audit based on confidential enquiry of the hospital based maternal deaths revealed the well-known death causes; post partum haemorrage (PPH), infections, unsafe abortions, preeclampsia and obstructed labour (Sorensen et al 2010). Tanzanian obstetricians assessed that in three out of four of the cases the deaths were due to major substandard care at the hospital and these lives could and should have been saved if timely EmONC had been performed (Sorensen et at al 2010). As a consequence the staff at the hospital underwent two days EmONC training by an adapted version of the Advanced Life Support in Obstetrics (ALSO) course. This low cost intervention proved to have a significant impact on PPH (> 500 ml blood loss) which was reduced from 32% to 18% and severe PPH (>1000 ml blood loss) which was reduced from 9% to 4.5% (Sorensen et al 2011b). Hence assuring quality EmONC in a developing world context seems to be a key to improve maternal health and audits and ALSO training are examples of feasible and cost effective ways to do so.

Pelvic floor disorders

With the introduction of the Millennium Development Goals, there has been an immense focus on reducing maternal mortality and available statistics indicates that progress is made. However maternal deaths only represent the tip of the iceberg. For every woman who dies, some twenty others face serious or long-lasting consequences. Such maternal complications include urinary incontinence which is a result of a damaged pelvic floor caused by prolonged or obstructed labour. By far the most severe and distressing form of urinary incontinence is obstetric fistula - a hole which forms in the vaginal wall communicating into the bladder. The consequence is permanent leakage of urine through the vagina, a condition that is almost unendurable for women, who are at risk of serious social problems, including divorce, exclusion from social activities and worsening poverty (Muleta 2006; Mselle 2011). Stress incontinence, which is also associated with prolonged or obstructed labour, is a less severe but yet prevailing form of urinary incontinence that may also lead to social exclusion. Uterine prolapse is another common debilitating condition triggered by difficult, prolonged labour, frequent pregnancies, inadequate obstetric care, and carrying heavy weights. As a result the supporting pelvic structure of muscles, tissue, and ligaments become weak and the pelvic organs uterus may drop into or even out of the vagina. This can limit a woman's mobility, making it impossible for her to perform routine household chores or have sex. The women who suffer from pelvic organ prolapse may end up being abandoned by their husbands and considered social outcasts in their own communities. International donor organisations are increasingly acknowledging the problem of maternal morbidity and investment has been made to strengthening health systems and ensuring adequately trained and skilled human resources, especially with a view to the management of obstetric fistulas (UN 2012). In contrast, despite many women in sub-Saharan Africa are suffering from stress incontinence and pelvic organ prolapse and the devastating consequences (Megabiaw et al 2012), only little attention has been given to help the women recover from these health problems. Focusing on stress incontinence, the treatment can be either conservative with behaviour change or surgical. The success of treatment depends on the correct diagnoses in the first place. The surgical procedure of choice for stress urinary incontinence in females is a sling procedure where a synthetic mesh is placed under the urethra through one vaginal incision and two small abdominal incisions. The idea is to replace the deficient pelvic floor muscles and provide a backboard of support under the urethra. This minimal invasive procedure is performed as outpatient procedure in high income countries and has an 87-97% cure rate (Lee et al 2007; Lord et al 2006). In most low income countries the procedure is not available due to lack of physicians who are trained in the procedure. When it comes to pelvic organ prolapse, the treatment is in some cases a rubber ring, or pessary, which is inserted to stabilize the pelvic organs. This simple procedure may mean a total change in the women's quality of life. For more severe cases surgery is required.

Cervical cancer

Cervical cancer is one of the most prevalent and deadly female cancers worldwide and sub-Saharan Africa, is by far the most affected region in the world accounting for 80% of the new cases and 85% of the deaths worldwide (Arbyn et al 2011). Cervical cancer is caused by the human papilloma virus (HPV), which is a

sexually transmitted infection. In developed countries with well-established screening programs, the incidence of cervical cancer has been reduced by 70-90% (Sankaranarayanan et al 2001; CCA 2012). In contrast, in developing countries where access to screening services for cervical cancer is often limited or non-existent the incidence of women affected by the disease continues to exist at high levels (CDC 2010; Denny et al 2002; Sankaranarayanan 2003).

We have previously documented that HPV infection is common in Tanzania and that HIV positive women are more likely to be infected with HPV (Dartell et al 2012). We have additionally found that the existing screening program, which is based on visual inspection with acetic acid, only reach a limited number of women (Kahesa et al 2012a) and not always those who are most at risk of cervical cancer (Kahesa et al 2012b). It is therefore not surprising that the age standardized cervical cancer incidence in Tanzania ranges among the highest in the world with an estimated incidence rate of 68.6/100,000 (Arbyn et al 2011). This incidence rate is also high when compared to other sub-Saharan African countries. Acknowledging the increasing burden of disease, a cervical cancer screening program was established in Dar es Salaam with support from WHO, IARC and the International Network for Cancer Treatment and Research (INCTR) in 2002. The program is at present being rapidly scaled up and is now implemented in 84 sites in Tanzania and according to the implementation plans cervical cancer screening will be provided in 215 clinics in 2015. Women who are screened positive are treated with either cryothreapy or conisatio according to the severity of the lesion. If the woman is suffering invasive cancer she will be referred for surgical treatment. However, at present only very few surgeons are able to perform radical hysterectomy and the vast majority of women with cervical cancer are succumb to premature deaths.

Human resources

Recently many public health initiatives, such as e.g. Doctors Without Borders, have emphasized the importance of clinical and surgical training, stressing that countless lives could be saved and quality of life improved if only local doctors had the advantage of learning clinical and surgical skills and how to apply them in their own settings. This does also apply for Tanzania where skills of human resources has emerged as perhaps the single most important barrier to achieving universal access to reproductive health service which is stated as a target in the millennium development goal framework (UN 2012). Although human resource deficit is not new, the search for effective, affordable solutions is warranted. In that relation it has to be acknowledged that young Tanzanian doctors are often given sole responsibility for operating a busy hospital shortly after graduation from medical school without previous medical experience. Too often they are overburdened with extraordinary heavy patient loads and it may be difficult to consult specialist colleagues or the latest medical literature. Additionally, they are geographically distant from access to opportunities for specialization. Hence there is an immense need for supporting Tanzanian doctors in upgrading their skills to satisfy their professional desires and need for continuing medical education.

Research collaboration and exchange

Tanzanian doctors are, however, not only lacking clinical skills. Since health systems are expensive to run it is crucial that the relatively scarce resources are being used cost effectively. Such prioritization requires evidence-based decision making which is based on comprehensive knowledge about the determinants of health, knowledge about new effective treatment procedures as well as knowledge about the capacity of the health system to implement new treatment procedures. To generate such knowledge there is a need of researchers who are trained in conducting critical and well informed research on prevailing clinical problems.

The project will therefore, in addition to clinical training, give priority to research collaboration between KCMC and University of Southern Denmark (SDU). It is believed that both KCMC and SDU will benefit from such collaboration. Hence, traditionally, the health sector has been closed and nationally focused. However, efficient and inexpensive transportation has created an environment where diseases and life styles are shared across borders. This has made people in high income countries more susceptible to communicable disease such as HIV/AIDS, malaria and TB and people in low income countries more susceptible to non-communicable diseases. Also when focusing on reproductive health, the project may be of mutual value, since it is anticipated that the Danish partner through the collaboration will get an understanding of how cultural diversity may have an impact women's sexual and reproductive health. Since Denmark is hosting a population of immigrant women who come from a cultural background which differs from the traditional Danish culture, this knowledge may in a longer perspective help future doctors in their daily clinical work.

The proposed project will create opportunities for both Tanzanian and Danish students to become familiar with the mentioned global health challenges through collaborative research activities. An exchange component will create possibilities for master students from KCMC and pre-graduate research students from University of Southern Denmark (SDU) to involve them self in joint research activities and visit each other departments in relation to their research training. The collaboration between KCMC and SDU will also make it possible to establish twinning projects where phd students from KCMC and SDU work jointly on a shared research project. It is believed that such global collaborative research will have added value in targeting emerging global reproductive health problems for the benefit of populations in both Tanzania and Denmark.

The strategic approach

The proposed project is a strategic collaborative partnership between KCMC and OUH and it has three elements: i) an approach to improve quality of emergency obstetric at KCMC; ii) an approach to improve surgical skills of gynaecologists at KCMC and; iii) an approach to enhance research capacity at KCMC.

The part of the project which focuses on improved quality of emergency obstetric (WP 1) at KCMC will be closely linked with the Tanzanian ALSO organisation which has its headquarters at KCMC. The ALSO organisation in Tanzania was established in 2008 in collaboration with Bjarke Lund Sorensen (co applicant on this proposal) and Duke University, NC, USA. Disseminating, documenting and developing the ALSO training together with criterion based audits on specific components of EmONC and criterion based audits on maternal and perinatal deaths will be ways to strengthen the quality of EmONC.

Improvement of surgical capacity in relation to pelvic floor disorders and cervical cancer will be achieved through interaction with physicians from Denmark (WP 2). The project will support sub-specialist training for gynaecologists within the field of urogynaecology and oncogynaecology through in country and out of country training. The project will thereby make it feasible for Tanzanian obstetricians and gynaecologists to expand their qualifications in the surgical service they are offering to women suffering from urinary incontinence, uterine prolapse and cervical cancer. Since KCMC is having training obligations of future obstetricians and gynaecologists, it is anticipated that the skills taught as part of the project will be disseminated to younger colleagues and the knowledge and service provision thus expanded.

An additional aim of this project is to build research capacity with a view to pelvic floor disorders and also to build capacity of the Danish partner to engage in collaborative projects premised on shared principles (WP 3). The research activities will be carried out as a twinning arrangement involving Tanzanian and Danish researchers. Synergies will be created between the surgical training (WP 2) and the research activities (WP 3). The starting point for the proposed research collaboration is strong as KCMC is a partner institution in the human health platform under "Building Stronger Universities (BSU)" which is a partnership between research and higher education institutions in developing countries and Danish universities. The PI of the present application is member of the BSU steering committee and has also been involved in the planning and implementation of the human health platform at KCMC, which is part of the BSU initiative.

Rationale

The proposed project focuses on upgrading clinical skills as well as research skills of Tanzanian doctors with a view to emergency obstetric and neonatal care, urinary incontinence, vaginal prolapse and cervical cancer which are health problems leading to greatly impaired quality of life and/or premature deaths among the poorest and most marginalised women in Tanzania. Health and health sector support has always played a key role for Danida's assistance and the right to sexual and reproductive health is a key element in the Danish Strategy for development cooperation (Danida 2012). Denmark has been lead donor within the Health Sector in Tanzania for many years and the Danida health sector support program is expected to continue in the foreseeable future. Thus, the focus area of the project is aligned with the Danish strategy for Development Corporation with Tanzania. Danida is also recognizing the impact poor functioning health systems have on health and development. This aspect is also addressed in the present study, where Tanzanian doctors are receiving continuing medical education and training to address important sexual and reproductive health problems. The planned activities are also aligned with the Tanzanian Health Sector Strategic Plan III (HSSP III 2009-2015) which lists Reproductive and Child Health as a priority area. Tanzania's health policy recognizes the importance of research and the use of research findings in improving health service delivery. This is extended and explored further in the national strategy for research for health as described in the document Tanzania National Health Research Priorities (NIMR 2006). This strategy highlights the continued need for research on sexual and reproductive health. The clinical as well as research knowledge base at OUH matches perfectly with these identified needs for action. OUH is one of four university hospitals in Denmark and the department of obstetrics and gynaecology is one of the largest in the country with a large patient flow and a well-recognised expertise in obstetric care,

pelvic floor problems and gynaecological cancers. The department has a stimulating and growing research environment which deals with obstetrical and gynaecological research areas from both a clinical, epidemiological and qualitative perspective.

Goal and Expected Outcomes

Goal and objectives

The over-arching goal of the proposed project is to improve reproductive health among women living in Kilimanjaro Region, Tanzania through and enhancement of obstetrical and gynaecological skills and an enhancement of research capacity within obstetrics and gynaecology. The activities will be divided in four work packages:

Work package 1 Improved emergency obstetric and neonatal care.

Work package 2 Strengthened surgical capacity with a special view to diagnosis and treatment of urinary incontinence, uterine prolapse and cervical cancer

Work package 3 Improved capacity to conduct critical and well informed research

Work package 4 Implementation, Monitoring and Review of the Project

Expected outputs

The intended outputs of the project according to each work package are as follows:

Work package 1 Improved emergency obstetric care

- Output 1.1 Improved obstetrical knowledge obtained through a workshop where focus is placed on EmONC signal functions: 1) PPH, 2) infection, 3) hypertensive disorders of pregnancy, 4) prolonged labour and 5) post abortion care, 6) neonatal resuscitation and management, 6) caesarean section and 7) blood transfusion

- Output 1.2 Competencies and equipment to provide the signal functions of EmONC

- Output 1.3 Further dissemination of the ALSO training program, which include the training in the above mentioned signal functions, to district hospitals and health centres in KIlimanajro Region

- Output 1.4 Implementation of criterion based audit on the signal functions of EmONC; prevention and management of 1) PPH, 2) infection, 3) hypertensive disorders of pregnancy, 4) prolonged labour and 5) post abortion care, 6) neonatal resuscitation and management, 6) caesarean section and 7) blood transfusion

- Output 1.5 Implementation of criterion based maternal and perinatal death audit and confidential enquiry into maternal and perinatal deaths

- Output 1.6 Guidelines for EmONC management and quality assurance

Work package 2 Strengthened surgical capacity

- Output 2.1 Surgical equipment for uro-gynaecology in place
- Output 2.2 Improved knowledge of how to diagnose and treat pelvic floor disorders
- Output 2.3 A core group of gynaecologists who are able to perform sling surgery for urinary incontinence and vaginal prolapse surgery
- Output 2.4 Standardized guidelines in uro-gynaecology
- Output 2.5 Surgical equipment for onco-gynaecology in place
- Output 2.6 Improved knowledge of how to diagnose and treat gynaecological cancers
- Output 2.7 A core group of gynaecologists who are able to perform radical hysterectomy
- Output 2.8 Standardized guidelines on diagnosis and treatment of cervical cancer in place

Work package 3 Improved capacity to conduct critical and well informed research focusing on the following areas:

- Output 3.1 : Obstetric fistula – a community based approach to establish a treatment referral link for fistula women
- Output 3.2 Information about the magnitude of the problem of pelvic floor disorders in Tanzania
- Output 3.3 The impact of pessary treatment of pelvic floor disorders
- Output 3.4 Improved collaboration between researchers and research institutions at KCMC and OUH

Work package 4 Implementation, Monitoring and Review of the Project

- Output 4.1 System for Project management and monitoring established and maintained
- Output 4.2 Project performance monitored continuously and reported periodically

Project design

Collaborating partners

The project partnership brings together obstetricians and gynaecologists from Tanzania and Denmark. The Tanzanian partner, KCMCentre, is one of four referral hospital in Tanzania and it serves more than 11 million people in Northern Tanzania. The hospital has over 450 beds, with hundreds of outpatients and visitors coming to the centre every day. Over 1000 staffs are employed and the hospital is offering postgraduate courses for MSc degree in Urology, Ophthalmology, Surgery, and Obstetrics and Gynaecology. The department of Obstetrics and Gynaecology is staffed with 4 obstetrician and gynaecologist and 12 residents who are training to become specialists in gynaecology and obstetrics. The department attends 3500 deliveries per year. KCMcollege is a constituent component of Tumaini University, which is Tanzania's largest university. The college offers 16 health-related degrees and has more than 1100 students making it the second largest academic health training institution in Tanzania. KCMcollege is organized in 3 Faculties (Medicine, Nursing and Rehabilitation Medicine). The College offers postgraduate specialty training (9 different Master of Medicine programs with clinical and academic focus), a Master of Public Health, and PhD training. The main pre-graduate training activity is the MD program with an annual uptake of 120 medical students. As described below, KCMC has a strong link to Danish Universities through the BSU initiative.

The Danish partner, OUH, is one of four university hospitals in Denmark. It covers 10 % of the Danish health care system and employs 9300 persons. The department of Obstetrics and Gynaecology is one of the largest in the country and is staffed by 50 consultants and 12 residents. The department offers centralized and specialized treatment within all areas of obstetrics and gynaecology. Annually, 4600 women deliver at the department. The gynaecological service is provided by sub specialized teams (urogynaecology, onco-gynaecology and benign gynaecology) who are offering treatment at a highly specialized level. The urogynaecological team is performing a total of 600 vaginal operations per year (150 sling procedures for urinary incontinence and 450 prolapse surgeries). The onco gynaecological team is serving 40% (2 mio) of the Danish population and is performing 450 cancer surgeries per year. The department has an active research unit which employs 6 professors, 9 associated professors and 8 ph.d. students.

Activities

The strategic approach and prioritized activities have been discussed through informal meetings in 2012 where representatives from KCMC and OUH participated. In December 2012 partners from the Danish team performed a needs assessment visit to KCMC where the training activities were further discussed. It was decided that priority should be given to 1) improvement of emergency obstetric and neonatal care, 2) improvement of surgical skills with a specific focus on pelvic floor disorders and gynaecological cancers and 3) enhancement of research capacity at KCMC. In January 2013, the activity plan was discussed with the two heads of departments at KCMC and OUH and an additional meeting was held late January with the Executive director of KCMC who approved of the project plans.

Work package 1 Improved emergency obstetric and neonatal care

The project will develop and document strategies to improve the quality of EmONC through EmONC training which will be provided by the already established Tanzanian ALSO program. The project will further develop EmONC guidelines and training content based on locally performed criterion based audit on EmONC components and maternal and perinatal deaths. The dissemination of the ALSO activities will be enhanced by strengthening the administration of the course, by quality assurance of instructor competencies, by local ownership by training instructors from all health facilities included in the program and by advocacy among politicians and decision-makers. Training in EmONC will be adapted to the context as it has been in the Tanzanian ALSO program. Further adjustments will strengthen the effectiveness of the course, these adjustments will be based on the findings of criterion based audits and feed-back from participants.

Work package 2 Strengthened surgical capacity

The projects approach to building capacity will place an emphasis on surgical training. The programmed activities to develop and implement urinary incontinence surgery, vaginal prolapse surgery and radical hysterectomy will take into account priorities outlined in the Hospital Services Package. All training activities will be supported by mutually agreed learning targets and objectives.

In country training will be provided by experienced urogynaecologists and experienced oncogynaecologists from OUH, who will be based at KCMC for approximately two months on an alternating basis. They will collaborate closely with the health staff at KCMC to provide in-service training, supervision, mentoring and technical support for KCMC doctors and nurses. Out-of country training will be provided at OUH where two identified gynaecologists from KCMC will be invited to Denmark for a two months periode to obtain hands-on surgical experience through operations performed together with colleagues from OUH. Out of country training will be additionally supported by adequate pre-placement planning and targeted mentoring to assist the integration of new skills and approaches on return to KCMC. The project will also support the specialist training for medical graduates who have already commenced specialist training in obstetrics and gynaecology through short course training carried out by the visiting experts from OUH. To facilitate a 'learning by doing' approach to in-country training, all resident gynaecologists may participate in the surgical training at KCMC if considered appropriate.

Work package 3 Improved capacity to conduct critical and well informed research with a view to pelvic floor disorders

To address the overlooked problem of pelvic floor disorders, the proposed project will through a health system strengthening intervention identify women with obstetric fistula, urinary incontinence and pelvic organ prolapse who will be approach at community level and subsequently diagnosed at health center level. Fistula women will then through a cell phone intervention be linked to treatment and ongoing care at referral level. Women with urinary incontinence and pelvic organ prolapse will be offered treatment by

trained midlevel providers working at health center level. All women will be followed to assess the effect of the treatment.

Work package 4 Implementation, Monitoring and Review of the Project

To ensure close liaison between KCMC and OUH and to support resident staff, visiting teams, training activities and the institutional linkages a Project Management Team (PMT) will be established. It will include the heads of the obstetrical and gynaecological departments at KCMC, OUH and SDU and the work package leaders. PMT meetings will take place each year to review progress, discuss and approve projected work plans and expenditure, and adapt to constraints and emerging risks.

Each work package has defined tasks and outputs as part of this application. These will form the foundation for tracking project status. On a twice-yearly basis, the work package leaders will report project status to the PI according to six criteria:

1. Quality – The work reflects the original outputs and is being executed at a high quality.
2. Adherence to Schedule – The work is being conducted on schedule and defined tasks are being done
3. Budget – The work is being executed within budget
4. Partner Satisfaction – All partners are engaged and satisfied
5. Results have been documented

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