Summary

This research aims to identify to what extent the analysis of the utilisation of plural medical systems (*cf.* Slikkerveer 1989) can contribute to the organisation of public health, in particular in Serengeti, and in a broader sense in comparable situations in rural Africa. It wants to provide a foundation for the development of a new health manpower training initiative for public health staff, the 'Transcultural Public Health Management' curriculum. It includes a deliberate integration of ethnoscience methods during the training, in order to achieve a better understanding of the influence of socio-cultural and endogenous knowledge factors on the functioning of public health care. It also provides clues as to how organisational improvements can be achieved. The research follows the invitation of the Mennonite Church (KMT) in Tanzania to assist its educational institutions in the transformation to a university which can play a role in the training of personnel for public health management, to tackle the urgent manpower shortage. In 2014, the Serengeti District Health Management Team formulated the desire to gain insight into the actual impact of the utilisation of plural medical system on existing health policies. The research model as used in this study (see 3.1.1.), is developed by Slikkerveer (1989), and previously applied by Agung (2005), Ibui (2007), Djen Amar (2010), Leurs (2011), Ambaretnani (2012), Chirangi (2013), Aiglsperger (2014), Erwina (2019) and Saefullah (2019).

The background to this study is formed by developments in the field of public health (Chapter I) in the sub-Saharan region from the colonial period to the present, using earlier policy concepts such as Primary Health Care (PHC). It provides recent examples from local developments in Tanzania, while referring to the Sustainable Development Goals (SDGs) as formulated by the WHO for 2030. It gives an overview of the diversity of aspects which are addressed in public health strategies, and where some aspects are lost because of cultural, economic, infrastructural, personnel or organisational limitations (*cf.* Azevedo 2017a, b). These are assessed based on the situation in Serengeti and, where possible, set against comparable relevant situations elsewhere on the continent.

The research took place in three consecutive years in Serengeti, through an extensive pilot study in 2015, a household survey in 2016, followed by verification and updating of specific findings in 2017. The quantitative and qualitative research were always conducted simultaneously. The identification of the research locations was based on the experience and indications of the public health department in Mugumu. While two hundred households were surveyed in four locations according to the geographic distribution parameters, a second team undertook multiple in-depth interviews with thirty key-informants identified on the basis of their function in local government, formal education, healthcare, religious and social organisations. From a total of 1,213 people registered in the household survey, the cases of 564 active patients, selected for a reported morbidity during the last twelve months, were analysed to determine the utilisation patterns of 715 actions. During that process, an inventory was made of the classification of perceived morbidity, the knowledge of applied traditional and alternative therapies, arising from the open questions in the household survey, as well as the opinion about local health care. The research question was: *'What type of patient uses what kind of medical system for which perceived morbidity?'* For the nine underlying research objectives, the following questions were addressed:

Firstly: to document, analyse and explain the relationships between the independent, intervening and dependent factors of the conceptual model in the utilisation of the plural medical system by the

local population. The applied theoretical framework as presented in Chapter II serves to account for both the research methodology and for the policy-determining principle for a future development strategy (*cf.* Slikkerveer, Warren & Brokensha 1995). The underlying idea is an "emic" approach, which is based on perception by the local population at all times, and which must promote development "from the inside" and "bottom up." In this way, the concept of "Indigenous knowledge systems" (IKS) provides an interpretation of the conceptual model of behaviour in the utilisation of the plural medical system (*cf.* Slikkerveer 1989). In this model of so-called "medical pluralism" a distinction is made between traditional, transitional and modern medical systems, which are explained in their local context.

The research methodology as presented in Chapter III, is based on the Leiden School of Ethnoscience as promoted by the LEAD programme, in which a combination of qualitative and quantitative methods is applied. These are named as the field of ethnographic study (FES), the historical dimension (HD), the point of view of the participant (PV). The parameters for the quantitative analysis are formed by a model of nine blocks of variables (*cf.* Kohn & White 1976; Slikkerveer 1989). These are five blocks of independent or pre-disposing factors, one block of intervening variables, and three blocks of dependent variables. They are analysed in conjunction through bivariate, mutual relations, and multiple regression analysis. The strength of the correlations between the blocks in the model give direction to the interpretation of their mutual relations. The blocks in the model also served as components for the construction of the questionnaire in the household survey.

An overview of the most important findings is presented in Chapter VIII. The research objectives are answered sequentially: In total 41.7% of the actors use TM, 21.5% use TR, and 36.8% use MM (N=715). The highest values in the analysis of the independent variables is belief in TM, opinion on TM, costs of TM, all values above 0.7 followed by availability of TM and costs of transport to TM, all around 0.6. The clustering in Figure 7 shows the coherence between the related aspects of medical system utilisation. Figure 8 presents the relationships between the blocks of independent and dependent factors. It is established that block 2 the pyscho-social factors are ultimately dominant in coherence with block 4 perceived morbidity and block 5 the institutional factors (see 8.2). First in connection with block 7 TM in dimension one, and with block 9 MM in dimension two for the dependent variables respectively.

In addition to perceived morbidity, the independent variables which receive sufficient correlation values in both dimensions are; who was consulted for treatment, who was the source of knowledge, whether the treatment was socially acceptable, the costs and transport to TM, and whether the treatment was economically efficient. Whether the symptoms were clinically diagnosed is only associated with MM, as the intended control function with other medical systems was not achieved because of limited data. The source of knowledge regarding disease and treatment is dominated by immediate family members (46%), who appear gender-based, the majority being women among spouses, parents and grandparents. In respect of the low impact of health education (block 6), the Village Health Worker's (VHW) role at the community level remains intact. In the treatment consultation the VHW and traditional healers receive the second and third highest frequency respectively, while they are not family related.

The most important movement in utilisation between medical systems results from consecutive or alternative treatments due to dissatisfaction with an initial therapy in the short term. The movement can be multi-directional. A hospital visit can be followed by TM and vice versa, but no correlation

has been found with a specific morbidity, except for those with mental or spiritual connotations. Another movement which deviates from an expected process are the transitional medicine (TR) which are commercially purchased and applied after an official diagnosis at modern medicine facilities.

Secondly: to study and explain the role of the local knowledge and belief of perceived illness causation in the utilisation process, as presented in Chapter VI and VII. The interview themes include the perception of local health problems, the opinion about the available medical systems, as well as cosmological and cultural aspects which may play a role in utilisation. The transcripts of these multiple interviews are presented by sector, local government, education, healthcare, religious and social organisations, as well as representatives of the traditional medical system. They are instrumental for understanding and interpreting the qualitative data analysis.

Particular attention is paid to local cosmological statements regarding health and behaviour, and the classification of prevailing morbidities. A noticeable distinction in the classification of morbidities is the dichotomy between 'old' and 'new' diseases. It originates from an historical perspective and individual experiences. Diseases such as cancer, diabetes, cardiovascular deficiencies, hypertension, obesity, HIV and Ebola are considered 'new' and, according to respondents, are therefore more difficult to treat with self-medication or TM. Most other perceived morbidities are at one time treated with TM.

The qualitative research in Chapter VI shows that general knowledge of TM is common, but specific knowledge regarding the preparation of indigenous traditional medicine is limited and is transferred on a personal relational level *i.c.* family members or acquaintances. There are indications of gender influence as the knowledge seemed to reside with a majority of female respondents. Most traditional midwives (TBA's) combine their practice with herbal medicine. They perceive the transfer of knowledge problematic due to a lack of interest among the younger generation. The complexity in the preparation of TM lies in the combination of the various species and their application. Regarding the complementary outcome of quantitative and qualitative data, there are two phenomena which stand out: the extent to which self-treatment is dominant, firstly by applying home remedies (TM), secondly in applying commercial medicine from the transitional system (TR), as well after- as without official diagnosis or prescription.

Thirdly: to present a sociographic description of the research area in Serengeti in general, and of the Kurya community in and around Nyamburi in particular. The research area in Serengeti is described in both geographical, historical and socio-cultural terms in Chapter IV, including the district profile of the local government. Next to that it presents the specific conditions applying to the population in Ikorongo in the household survey.

The qualitative research which took place among selected key informants is described in Chapter VI, which produces an historical perspective as expressed by the prominent elderly people identified by the community.

The broader background with regard to the health care situation in Tanzania is elaborated in Chapter V, which describes recent developments in policies, health manpower and infrastructural challenges for the government, as well as the role of traditional medicine and the commercial (transitional) sector. It enumerates the policy priorities in the medium and long term, and their relationship with the Sustainable Development Goals (SDGs). It explores the possibilities of

addressing the current health manpower shortage by assessing alternative forms of co-operation. It also refers to recent policy intentions which strive for more independence from external support from national and international NGOs in existing first-line services and embedding them better in society.

Fourthly: to present an indigenous classification of local Medicinal, Aromatic and Cosmetic (MAC) plants, including their preparation and application, as well as their use for the treatment of specific illnesses as presented in Chapter VII. It specifies the indigenous knowledge collected from the open questions during the household survey, with regard to the perceived morbidities and the known traditional therapies. These are described with the identification of specific indigenous species and their application as indicated by the individual respondents. The classification is expressed in local terminology only (*Igikuria)* and verified by local traditional herbalists, for the sake of consistency to the emic principle. The scientific categorisation of botanical data took place post-hoc on the basis of the collected images. Their use is also assessed for spontaneous knowledge and individual application, as well as indirectly acquired knowledge via acquaintances, and the observed overlap and frequency. It serves to encourage examination of the diversity in the use of identified species aimed at specific disorders in other (sub-)regional areas, especially where they are consistent and where they deviate from existing botanical data.

Fifthly: to present the stepwise bivariate, mutual relations, and multiple regression analysis of the transcultural health care utilisation behaviour by the local population, in order to document and explain the interactions between the groups of factors, as described in Chapter VII. The bivariate analysis shows the selection of variables which play a role in the utilisation per medical system, and which are included in the multivariate analysis. It is followed by the interactions between the sets of variables per block. These interactions provide the opportunity to visualise the applicability of the conceptual utilisation model, also as a predictive operational tool for sustainable community development. The processing of the data is executed by the module "Data Reduction - Optimal Scaling" (OVERALLS) of SPSS (version 21).

The results of the bivariate analysis with system utilisation shows a residue of 19 variables over the five blocks of independent –predisposing- factors, all of which reach Pearson $\chi 2 = 0.000$ level and score on Cramer's V (for nominal variables) from 0.151 to 0.363. In total, 41.7% of the actors use TM, 21.5% use TR, and 36.8% use MM (N=715). It also shows that block six, with intervening variables such as media and information campaigns, does not score sufficiently to be included in the multivariate analysis. Of the socio-demographic factors, the land in possession, the amount of livestock owned and the number of modern media in use remain relevant. From the pyscho-social factors, who is consulted for advice, who is the source of knowledge, the belief in TM and the opinion about TM's efficacy are distinctive. Among the enabling factors, the costs of TM and TR, as well as the costs of transport to TM, and finally Social Economic Status appear to be important. Of the fourth block, the perceived morbidity, the duration of illness and the external diagnosis by a third party are distinctive. Among the institutional factors, the availability of modern (MM) and transitional means (TR), together with environmental friendliness, social acceptance and economic efficiency, are distinctive.

In the multiple regression analysis, the variables which show a substantial correlation in both dimensions are who is consulted for advice, whether the therapy is socially acceptable, who is the

source of knowledge, the costs of TM, and whether TM is economically efficient. For the dependent variables, that is the use of TR. It is evident that with the dependent variables, TM is dominant in the first dimension, followed by TR with a moderate score, while MM is in the second dimension, followed by TR, with a moderate score. In the bivariate analysis, it is clear that the variables which were most discriminating appear to be consistent with their position in the first dimension and the second dimension, although occasionally in a reverse order. The variable "clinically diagnosed", highest in the bivariate analysis, appears here only in the second dimension with a high value, probably due to the relationship with the utilisation of MM. In Figure 7 it is clear that the combination of belief in TM, costs and distance to TM have a small mutual distance in both dimensions, which indicates that the conviction and accessibility of TM form coherent motives, closely related to perceived morbidity. The variables which are closest to the use of MM can be referred to as socio-economic status and the social acceptance of utilisation of the system. Conversely, in the second dimension the distance between TR, economic efficiency and environmental friendliness is very small, while who is consulted, who is the source of knowledge and who made the diagnosis, are in the same cluster. It shows that in addition to the influence of social relationships and indigenous knowledge on the use of TM, there is an identical influence with regard to the use of commercial resources.

The analysis of the relationships between the blocks of the utilisation model also shows that blocks 2 and 5 are most discriminate (7x), followed by block 1 (5x) and 3 and 4 (4x) respectively. These frequencies reflect the values of individual variables within the blocks. Between block 2 and the others, the consultation for advice from acquaintances and the source of knowledge are distinctive, as well as the belief in and opinion about TM. In block 5, the social acceptance of the chosen therapy, followed by the economically efficient quality of the therapy, and the availability of TM are distinctive. It indicates that the influences of personal relationships within the community are dominant over pragmatic considerations. The availability of TM receives a value of 0.938 in connection with belief in TM with a value of 0,903. Regarding socio-demographic factors from block 1, there are three variables which play a role in dimension 1, namely land ownership, livestock ownership and the use of modern media. The first, land ownership shows a relationship with livestock farming, but more importantly, with the use of TM in block 7, and with social acceptance in block 5.

Overall, the strongest relationship is between block 2 (psychosocial factors) and block 5 (institutional factors) with 0.802 in dimension 1 and 0.826 in dimension 2. The highest correlation between independent and dependent is between block 4 and block 9 utilisation of MM, 0.663 on external diagnosis, and between block 4 and block 7 utilisation of TM, 0.599 on perceived morbidity. The next strong relationship is between block 3 (enabling factors) and block 5 (institutional factors) with 0.769 in dimension 1 and 0.666 in dimension 2. That relationship is determined by the combination of the costs of TM, linked to the costs of transport to TM and the availability of TM. Referring to the qualitative data, this supports the proximity of TM in terms of psychological and physical distance, the number of people applying home remedies, available in their environment, and at negligible costs.

Sixthly: to assess the perception of the local population of the current modern medical system in the area from the qualitative research, in order to improve the co-operation between the available medical systems, as described in Chapter VI and VIII. In current health care, there primarily is the

aspect of physical accessibility: while TM is historically linked to the physical environment and therefore implicitly present in every local community, the facilities-based services at A level are limited by the resources available. Although this network has been expanded by village health workers (VHWs), most of whom work without a physical station, the distribution of facilities in rural areas will remain problematic in the medium term unless alternatives are found.
In addition, accessibility plays a role in socio-economic terms. While most services are accessible, and some are free of charge for the most vulnerable groups, such as Maternal and Child Health (MCH), HIV-positive people and elderly care, there is competition with alternative providers, both transitional and traditional. The health workers explain that the financial resources at district level are not sufficient for the intended services, while preventive services do not generate enough turnover to sustain themselves. The Community Health Fund (CHF) and other types of collective insurance do not yet have a volume to function as a financial basis to support monitoring and prevention services, or their expansion on community level.

The qualitative research shows that confidence in the technical capacities of MM is high, there is appreciation for surgery, laboratory test, vaccinations -immunisation, X-rays, life support systems e.g. infusion, blood transfusions, artificial respiration and compactness of modern medicines such as mass produced pills, sera, implants. At the same time, the attitude of many modern health professionals is often criticised. There is a notion of lack of feedback during consultations. The staff do not adequately explain to the patient the cause and effect of their morbidity or the proposed cure, while the attitude of many towards patients has been labelled as "arrogant" or 'rude'. The respondents indicate they have no idea as to what invokes this attitude. It raises a barrier for spontaneous consultation, especially among women.

There is a lack of top of mind knowledge concerning preventive measures. The popularity of preventive services is debatable. Although the health education campaigns are measurable, the impact is low. As stated in the qualitative analysis, integration with mainstream primary and secondary education should be increased, because children bare the promise of creating more awareness and at the same time indirectly reaching parents. A revival of the role play at village level for the recognition of potential dangers is endorsed by various key informants. The role of mobile communication has not yet been investigated, but the private ownership of multiple mobile devices is such that they are promising as a platform for health education or health emergency warnings to a wider audience, as is already practiced in Asia, the America’s, and parts of Europe.

As emphasised in Chapter IV and V, the health manpower situation is urgent. In a broader sense, this shortage is twofold, because it not only concerns doctors, but also paramedics at the community level. The options range from Public Private Partnerships (PPP) connected to formal training institutions, to the integration of traditional professionals in health care at the local level. Regardless of the renewed interest in the role of Community Health Workers (CHW), collaboration with TM is still an option. The argument expressed by staff members that certain traditional practitioners do not meet training qualifications does not invalidate the option to make them instrumental in early detection, primary health care or timely referral. Their confidential relationship with the community, demonstrated as well by traditional midwives, makes them a valuable manpower resource. There is a willingness among that group to co-operate and exchange knowledge, while individual traditional midwives (TBAs) have shown that they take responsibility by referring delicate cases to the hospital, sometimes even by accompanying patients. The phenomenon should preferably be reciprocal, sharing with traditional practitioners in return how they could achieve consistency in

quality while maintaining their traditional resources, which is what they expect from their interaction with the modern system. Because of the emphasis on manpower, the larger picture of collaboration with TM is pushed into the background. Qualitative and quantitative data show that the majority of perceived morbidities are first self-treated, while disorders with either mental or spiritual connotations usually focus on TM, as with convulsions with infants. It deserves to be investigated and used to improve health policies, rather than TM being dismissed as inferior, inappropriate or unmanageable.

There is a need for institutionalised interaction with what the WHO calls the "social determinants of health" (WHO, 2018) following the reaction of the local population after the Ebola outbreak in West Africa. There is an analogy with HIV/Aids when infection is not detected in time or intentionally ignored, recognisable as an aspect of PMTCT [37] projects. It also requires a change in behaviour of health professionals. Their awareness of the impact of health measures on the daily routine of the population *i.e.* their cultural traditions, must be reflected in local health policies. Just as volunteers from religious congregations who guide HIV-patients to prevent them from becoming a health hazard to the community, the similarity with other indigenous institutions is evident. There are high expectations of a renewed Community Health Worker (CHW) who must be able to anticipate health risks, collaborate with traditional healers, and use locally recognisable definitions where the community can identify with. Their training and status in the community will, however, have to be revised, given the experiences in primary health care (PHC) and those with the training of traditional midwives (TBAs).

There is a need to digitise medical information. It can enable early detection of hazards at district level. The proliferation of mobile phones and the coverage of internet providers imply that such an application is feasible. The staff members at the dispensaries are committed to collecting and registering relevant information. There is software but no internet connection to share data in time with the staff department in the capital. However, the costs of setting up these connections are disproportionately low compared to the logistics and manpower involved in physical relocation and alternative communication over large distances and unpaved roads. The staff members also want to be able to analyse information on location and provide feedback to Mugumu [38]. It means that any fluctuation in morbidity rates, lack of essential medicine, or epidemiological health hazards which require rapid intervention, are automatically detected by a headquarters which can analyse data in a network and simultaneously share it with its health centres and dispensaries.

Seventhly: to describe the theoretical implications of the research findings for the development of applied ethnoscience in the field of public health management, focussing on the influence of socio-cultural factors in attaining sustainable community development (cf. Slikkerveer et al. 2019) Chapter VIII shows the implications of applied ethnoscience: demonstrating the role of indigenous knowledge and practices leads to a reconsideration of how communities should be approached in mobilising their potential to handle health care related problems. By recognising indigenous beliefs and motives which underlie social behaviour, it is possible to exchange knowledge without losing semantic values. It can provide better identification, and influence unhealthy lifestyles, which may contribute more than large-scale conventional media-based health education campaigns.

Eighthly: to describe the methodological implications of the research findings for the further development of specific ethnoscience-based research methods and techniques as advocated by

LEAD to contribute to sustainable community development. The implications substantiate the appropriate capacity of the 'Leiden Ethnosystems Approach' as an instrument to assess the emic factors in the process, and as such link up with the Impact Assessment Model as introduced in the concept of *Integrated Community Managed Development* (ICMD) by Slikkerveer (2018). The method also enables the next generation of health professionals to work fully integrated because of their ability to communicate with the local population on an equal footing, especially when certain topics are considered controversial *e.g.* anonymous HIV/IDS carrying individuals or witchcraft attributed phenomena. The application of an ethnoscience customisation method is encouraged to contribute to what Nachega *et al.* (2012) indicate as the need to expand national training programs in the African region (WHO / AFRO 2012) with as many epidemiological and public health aspects as possible. Their analysis indicates that the emphasis on communicable diseases (CDC) and MCH should include non-communicable diseases (NCDs), and climate change with its environmental impact, as they will increase in the region. The main motive for applying these research methods lies in the identification of predictive indicators (Nachega *et al.* 2012). It also promotes the collaboration with programmes outside the region, or the application of digital distance learning in the current curricula. It refers to the lack of master level management cadre in health care, and the need for more training capacity to compensate for the lack of local resources.

Ninthly: to describe the practical implications of the research findings for the improvement of the public health management policy planning and implementation process. It contributes to the development of comprehensive health plans by the Serengeti District Health Management Team. It provides a community-oriented contribution to the Transcultural Public Health Management (TPHM) master course at Kisare College of Health Sciences in Serengeti. The policy recommendations concluding Chapter VIII were formulated as follows:

1) There is the possibility to revive community-based institutions which improve the prerequisites for sustainable health conditions on local level. They entail the revitalisation of community health committees, community health workers, and the structural co-operation with traditional practitioners in the disciplines in which they are available (*cf.* Ambaretnani 2012; Chirangi 2013). It could perform as an alternate human resources pool, provided there is dedication on district level to facilitate communications. The mobile outreach clinics of the early PHC could be revived to perform as a communications and training device, complementary to its original function as monitoring and control of MCH activities.

2) There is a request for an enhanced curriculum (see 8.3.3) to train staff in applying indigenous knowledge in their daily activities. Integration of social sciences in public health management curricula will improve the communications on community level; instigate a change in attitude and better reflection on the motives of the local population. It will enable health staff at different levels to identify with the health utilisation behaviour of their target group, and improve both preventive and curative services, as the correlation between the two has proven to be dependent on the perception of quality and accessibility of service. It could lead to a structural co-operation with TM practitioners, arriving at mutual respect, exchange of knowledge, and reducing health hazards.

3) There is an underestimated potential in the revitalisation of the Community Health Fund (CHF), by considering alternative ways of organising it. As shown in the qualitative analysis, integrating it with existing institutions on communal level, i.e. farmers' co-operatives, religious affiliations, or voluntary associations involved in any other economic activity related to reciprocal credit, are eligible as a vehicle to carry health insurance. Additionally, there could be proper re-evaluation as to which type of service should be covered, with consensus of all party's involved, and with long term commitment to build confidence. Finally, there are a large number of alternatives with regard to payment of fees which have not been explored yet, *e.g.* spreading in instalments, sharing, collective saving schemes, rechannelling through local associations, or digitised via mobile communications, so as to prevent the potential patients of avoiding consultation because of the financial impact.

4) There is a desire to start a digitalised health information system between the referral stations in terms of exchanging and analysing morbidity rates, drug supplies, health hazard early warning, monitoring and control, by applying technology which is already available, but has until now not been operationalised. There is commitment at A-level to establish such form of communications, and they could be established at a fraction of the cost of traditional logistics and physical movement. The hardware and software are available, internet providers are available, electricity is available, and the knowledge is available.

5) There is an option to enhance the impact of health education campaigns by extending the sourcing in primary and secondary education, while increasing the frequency of role plays, to appeal to the tradition of oral transmission in the transfer of indigenous knowledge. Because of the changing modalities of communications with mobile telecom, it is imperative to investigate the use of existing networks to introduce health hazard messaging on mobile devices. The next generation is susceptible to these channels and it could create a platform for proliferation through social media.

6) There is the possibility to re-animate the research into the application of indigenous traditional medicine, as a number of traditional practitioners indicated they would be eager to have their material examined. They propose that the scientific analysis of the components would have a twofold effect. First of all, it would take away the stigma of not having any recorded qualifications, secondly it would enable them to further develop their medicine in terms of conservation or reproduction and receive recognition. The main objective, in their words, is to finally receive feedback on the offerings they have consistently made. It is simultaneously a solid basis for future co-operation, and the intended integration between medical systems. It should receive the deserved attention, more so because the same practitioners foresee a lack of interest by the younger generation to engage in the laborious task of collecting and preparing the needed species. They fear that the knowledge will not be maintained or transferred, while they simultaneously experience a diminished availability of some species, endangering their preservation (see chapter VI).