Dear PHF steering committee members,

During the past year, in addition to teaching, research, and service, I also participated in a project with Upper Peninsula Health Plan (UPHP) in Marquette. Below I highlight some of the progress I have made since the last report.

**Progress Summary:**

**Teaching:**
- Graduated one PhD student in May 2019; currently advising three more PhD students.
- Developed one online course, Computational Statistics, for the MS program in Applied Statistics in the summer of 2019.

**Research:**
- Received departmental research award (Senior level) in Spring 2019.
- Co-authored four publications (three published and one accepted) in peer-reviewed journals since the last report in Nov 2018 (listed in the appendix).
- Submitted three external proposals:
  - To NIH, R01, as PI (Not funded)
  - To NIH, R01, as Co-PI (PI is Dr. Zhiying Shan in KIP) (Pending)
  - To State of Michigan, MDOT, as Co-PI (PI is Dr. Qingli Dai in CEE) (Not funded)

**Service:**
- Served as the graduate director in the math department.
- Served in the departmental Promotion, Tenure, and Reappointment committee (PTR) committee in the academic year of 2018.
- Served in the university Early Career Management (ECM) Committee as an external advocate for Kristin Brzeski in Forestry.
- Served as a member in the university Data and Safety Monitoring Board (DSMB).
- Invited as the Editorial Board member of Scientific Reports in May 2019 (The journal had an impact score of 4.525 in 2018).

**Outreach:**
- Invited Dr. Zheyang Wu, an associate professor from Worcester Polytechnic Institute, to give a talk in Spring 2019.
- Gave an invited talk at University of Northern Texas in the Department of Mathematical Sciences in Spring 2019.
As a representative at Michigan Tech, participated two conferences with Ann Levandowski, the Chief Quality Officer at UPHP and her staff members: one initial teleconference in Nov 2018 and one onsite meeting at UPHP in Jan 2019.

Last year’s initiatives and progresses:

I proposed two initiatives in the last report:

1. I planned to submit a R01 proposal to NIH in February (June by the latest if the project does not going as planned) with Dr. Scott Hebbring at Marshfield Clinic.

   - I submitted a R01 proposal to NIH with Dr. Hebbring in Feb 2019 as planned. However, the proposal did not receive a favorable review from the review panel. It was not funded.

2. Ann Levandoski suggested that we abandon the readmission project and look for a Pharmacy-based project. We are trying to devise a study question and the first conference on this project is scheduled on Nov 30th 2018.

   - In the meeting on Nov 30th, we discussed two potential projects: how does Diabetic Medication Compliance affects the Total Cost of Care for UPHP’s patient population and how does Decrease Utilization of Opioids affects the Total Cost of Care of the UPHP’s patient population. Note that UPHP serves Medicare and Medicaid patients for the whole Upper Peninsula.
   - In the meeting on Jan 2019, we decided to go with the first project since the strict opioid limit was just imposed in Jan 2019 and we won’t have enough data to perform data analyses for the second project. We further discussed what kind of data we would need for the analysis.
   - After the meeting in Jan, I did the IRB approval at MTU and UPHP did the data use agreement and sent the IRB application document to State of Michigan for the IRB approval in March 2019. Even though this is the first time that UPHP went through the IRB approval and they had to learn the process, they worked hard to move this project forward. It took State of Michigan a long time to approve the IRB. The IRB finally was approved in August 2019 and I just received the data from UPHP a week ago.

Current initiatives underway/planned:

- Although the R01 proposal was not funded, I have built the collaboration with Dr. Hebbring at Marshfield Clinic. He also invited me to do a sabbatical at Marshfield Clinic, so I can access the data at the hospital. He would like to visit Michigan Tech again and talk to other faculty members on campus that might further the collaboration opportunities between Marshfield Clinic and Michigan Tech. We plan to discuss the previous R01 proposal and make decisions on a future submission of a R01. We will either revise the proposal or submit a new proposal to NIH.

- My two graduate students and I did literature reviews regarding Diabetic Medication Compliance and Total Cost of Care after the first meeting with UPHP. Now we are ready to perform data analyses. I expect to have results by the end of Dec 2019, then write publications on the findings, and present them at UPHP and at a conference. In Spring of 2020, we will work on the second project on opioids if we can get the data. My long term goal on the collaboration with
UPHP is to submit a NIH proposal on health care and epidemiology studies in rural areas. The results we get from the first project can served as preliminary studies for the proposal.

**Note that** one of the expected activities for the PHFoundation Endowed Professor in Population Health is to initiate and grow collaborations regionally in areas relevant to population health. The collaborations with Marshfield Clinic and UPHP definitely provide me and potentially other health-related researchers at Michigan Tech great opportunities for the collaborations with these two institutes. Due to the lack of a medical school at Michigan Tech, it is difficult to obtain real data for health-related researchers at Michigan Tech on NIH proposals; however, both Marshfield Clinic and UPHP have rich data sets for collaborations. Collaborations with UPHP also provide opportunities to improve community health across Michigan's Upper Peninsula. For example, opioid misuse and addiction is a serious public health problem in the UP. In the meeting with Kevin Store, the executive director of the PHF in May 2019, Kevin said that PHF would like to know the regions with high rate of opioid and addiction in the UP, so PHF can develop strategies to target these regions. If we can get the data for the second project with UPHP, we would be able to provide this information to PHF.

**Brief Summary of how the funds have been spend**

I used the fund to support two graduate students (paid for their stipend for the academic semesters and summer terms; the department paid for their tuition), to pay for Dr. Zheyang Wu’s visit and for the trip to UPHP in Jan 2019.

**Tentative plans for endowed funds this upcoming year:**

In the upcoming year, I plan to use the funds for the following:

- Continue to support the two graduate student stipends with the help of the Department of Mathematical Sciences to cover tuition. The two graduate students will continue to work on the diabetes project with UPHP (perform data analysis, write publications on the finding, present the finding at UPHP and a conference), perform preliminary studies to assist NIH proposal submissions, and work on the second project on opioids if we can get the data in this coming year.
- Continue to invite visitors to Michigan Tech in order to improve relations and to create possibilities for future projects. Potential visitors: Scott Hebrinng at Marshfield Clinic and Mary LaBelle, a pharmacist at UPHP, the leader in the diabetes project.
- Pay for publication and data releasing fee.
- Pay for travel to conference presentations, to UPHP, and to Marshfield Clinic.

Please let me know if you would need additional information on this annual report.

Sincerely

Ying Sha, Professor in Statistics  
PHF Endowed Professor of Population Health  
Department of Mathematical Sciences  
Michigan Technological University  
Email: qsha@mtu.edu  
Phone Number: (906)-487-2146
Appendix - Peer-reviewed Publications in 2019 (* denotes corresponding author)


