Global Dermatology

Short Communication ISSN: 2056-7863

Global teledermatology

Rebecca Gaffney* and Babar Rao

Rutgers Robert Wood Johnson Medical School, USA

Introduction

Telemedicine is the delivery of health care services between two remote locations through information and communication technologies to improve a patient's health condition. It is a tool to increase access to quality care services for patients in both developing and developed countries in any situation in which there is a barrier to receiving treatment [1]. There are generally two methods of telemedicine delivery: store-and-forward and live-interactive. The store-and-forward modality involves the transfer of digital images with relevant patient information through email or a web-based platform to a specialist in a remote location for consultation. In live-interactive telemedicine, the patient and/or their healthcare provider meet with the consulting specialist and interact in real time through videoconferencing. Since its inception about 40 years ago in US hospitals, telemedicine services have expanded across the world and now include many different specialties [2,3].

Dermatology is particularly well suited for telemedicine because it is a visual specialty. Teledermatology, defined as the remote delivery of dermatological services and clinical information using telecommunications technology, is the second most developed telemedicine service area globally, behind teleradiology [1,4]. Teledermatology is a rapidly growing field due to technological advancements and its potential to address the shortage of dermatologists in rural and underserved communities. The most recent data published on physician needs assessment estimates that the ideal ratio of dermatologist to population ratio is 1:30,000 [5]. This need is largely unmet across the globe, as the International Foundation for dermatology estimates that 3 billion people in 345 developing countries lack basic care for skin diseases [6]. Table 1 demonstrates the disparity in dermatologists around the world [7].

Much of the current literature on teledermatology solely addresses its validity in healthcare delivery, evaluating diagnostic accuracy, reliability, and patient satisfaction in multiple short-term studies. However, there are few published works on established programs, pilot projects, or feasibility studies in teledermatology, which would indicate that a country has an existing infrastructure and technology that can develop into a permanent program. To the best of our knowledge, the prevalence and locations of teledermatology programs have not been assessed globally. The objective of this paper is to identify established and pilot teledermatology programs across the world.

Methods

This study looked at the 194 member states recognized by the World Health Organization. We searched the PubMed MEDLINE [in All Fields] and Scopus databases [in Article title, Abstract, and Keywords] for teledermatology programs in each country from 1995 to present. In our search, we used the terms "teledermatology AND [country]" and "telemedicine OR telehealth AND dermatology AND [country]". Only articles in English with titles and abstracts that were published online and in print were considered for inclusion. Search results were then screened and studies were excluded based on title and/or abstract if the study solely measured outcomes of diagnostic reliability and accuracy of teledermatology vs. face-to-face consultation, patient satisfaction with the program, or cost-benefit analysis. All articles with descriptive studies of established programs, pilot studies, and feasibility studies were reviewed. The reference lists of identified studies were also searched for further relevant studies.

Results

Of the 194 countries searched in the literature, 81 were found to have an established teledermatology program, a telemedicine program that includes dermatology, a pilot project in teledermatology, or a feasibility study in teledermatology. The study found 153 total programs globally. Among both active and non-active teledermatology programs, a majority (86%) of programs used store-and-forward as the method of delivery. The remainder of programs used live-interactive, a combination, or an unknown method of delivery.

There was a total of 133 sustained teledermatology programs or active pilot projects around the globe (Figure 1). These programs

Figure 1. Map of sustained teledermatology programs and active pilot programs *4 pilot programs are no longer active [8-40].

Correspondence to: Rebecca Gaffney, Rutgers Robert Wood Johnson Medical School Class, USA, **E-mail:** rgg49@rwjms.rutgers.edu

Received: September 06, 2015; **Accepted:** October 12, 2015; **Published:** October 15, 2015

include store-and-forward and live-interactive modalities delivered through government national health systems and other government initiatives, commercial organizations for consumers, and non-profit/charitable organizations. In addition, military use of ongoing teledermatology programs was also found in the literature review and included in this paper.

17 countries performed feasibility or pilot studies, indicating the presence of technology and teledermatology infrastructure which is presented below (Table 2).

Of 131 countries searched in the study that did not have mention of a teledermatology program, a majority (80%) were in the bottom third in terms of population rank [60]

Teledermatology programs in developing countries were mainly delivered through non-profit/charitable humanitarian health networks with volunteer physicians and a simple, web based platform or email for communication between the consultee and specialist (Table 3).

Discussion

According to a 2011 WHO survey on global telemedicine, teledermatology is more established in high-income group countries, where the main challenges include legal issues with patient privacy and confidentiality, limited reimbursement for practitioners, and competing health system priorities. Developing countries are more likely to face larger barriers to implementation such as resource issues, high costs, underdeveloped infrastructure, and lack of technical expertise [1]. Therefore, teledermatology has been adopted more for use in the developed world where it is seen as a cost-effective way to increase access to care for patients who cannot travel or have inadequate insurance [63]. However, it has great potential to address challenges faced to those in the developing world that are deprived of even basic health care access.

Although developing countries with a high burden of disease and limited resources or access to specialists can arguably benefit the most from teledermatology, many of these countries lack a reliable power supply and cannot afford any sophisticated software needed for a telemedicine exchange. Physicians and government health policy makers in these regions that have very little to spend on healthcare per person may doubt the need for expensive teledermatology equipment when that money could go to much needed drugs for skin diseases. Additionally, with the exception of leprosy and other infectious diseases that affect the skin, dermatologic conditions are given little importance in developing regions that suffer from major lethal health conditions such as malaria, tuberculosis, and HIV/AIDS [30].

Table 1. Dermatologist-population ratio in different regions of the world.

USA	1: 30,000
UK	1: 200,000
Other European Countries	1: 50,000
Asia	1: 2000,000 (Urban)
	1: 780,000 (rural)
Sub-Sahara countries	1: 1,000,000 (urban)
	1: 5-50 million (rural)
Central/South America	1: 76,000 (urban)
	1: 1-66 million (rural)

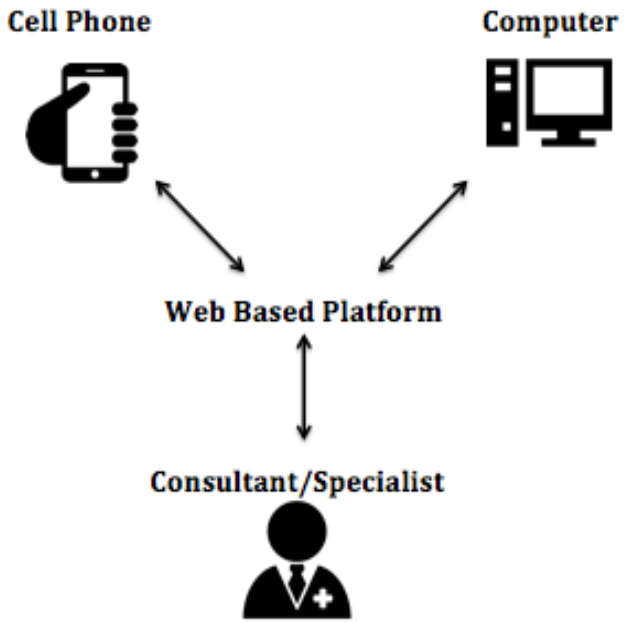

Figure 2. Flow of Information for Swinfen Charitable Trust, Telederm, and iPath Telehealth Networks.

Recognizing this dilemma faced by developing countries, humanitarian health networks have developed easy-to-use, open access platforms for underserved regions around the world. The only requirements for participation in the teledermatology programs are access to the internet and a device to send and upload pictures (digital camera or phone). Figure 2 shows a simple schematic of the information exchange in these health network teledermatology programs.

These telehealth networks have been proven to be an efficient method of consultation. A prospective review of email consultations between referring doctors and consulting specialists of Swinfen Charitable Trust operations showed a median time of 1.5 days from a referral to a definitive reply. A similar study conducted on Telederm showed that 60% of requests were answered within one day, 35% within one week, and 4% in two weeks during the first two years of operation. Because the only requirements for participation in the teledermatology programs are access to the internet and a device to send and upload pictures (digital camera or phone), these teledermatology programs have been able to penetrate many developing countries. From 2000 to 2015, internet usage in underdeveloped regions such as Africa, Latin America, and the Middle East have exceptionally grown (Table 4) [64]. Additionally, access to mobile services in the developing world has outpaced the rate at which much of the population is gaining access to basic services such as banking, sanitation, and electricity [65]. With internet and mobile phone usage becoming increasingly available in all areas of the world, these telehealth networks have the potential to expand to more developing countries.

This review was done to provide a comprehensive overview of the prevalence and locations of teledermatology programs globally and has some limitations. New teledermatology programs and pilot projects without published data could exist and were not included in this paper. Articles published in different languages were not reviewed which could possibly explain the lack of teledermatology programs found in

Table 2. Summary of studies on teledermatology programs.

Study	Country	Name and Location of Consulting Institution	Geographical Location(s) and/or Institution of Patient Recruitment	Modality and Relevant Technology	Comments
[41]	Argentina	Universidad Nacional de Tucuman	Ranchillos, Tucumán (province)	SAF using the Telemedicine in the Provincial System of Health (SIPROSA)	
[42]	Belgium	Partnership between Department of Dermatology, HôpitalUniversitaireErasme, UniversitéLibre de Bruxelles, Belgium and Dermatology Department of Kaolack Hospital in Senegal, West Africa;	Available to all internet users	Open source free website for telediagnosis, education, and information	Website titled "Black Skin Dermatology Online", intended for use of consult for patients with dark pigmented skin. Currently no telediagnosis on website
[43]	Chile	Consultation to a specialist in Santiago, Chile	Rural communities in Melipilla, Talagante, Isla de Maipo, Curacaví, and María Pinto, Chile	SAF using Ministry of Health (MINSAL) TD electronic platform	
[44]	Denmark	Department of Dermatology, Roskilde Hospital, Roskilde, Denmark	4 home-care organizations in eastern Denmark	SAF using Plejenet, a web-based program created by Dansk Telemedicin	Specifically looked at wound care
[45]	Egypt	Department of Dermatology, Al Hussein University Hospital of Al-Azhar University in Cairo, Egypt	Cairo, Egypt; Al Hussein University Hospital of Al-Azhar University	SAF on a mobile phone with ClickDoc (Click Diagnostics, Boston, MA) software and the telederm.org web-based platform	
[46]	Finland	Department of Dermatology, Tampere University Hospital in Tampere, Finland	Ikaalinen, Finland; Primary Health Care Centre in Ikaalinen	Live-interactive videoconferencing	
[47]	Germany	Clinic for Skin Diseases of the University of Greifswald, Greifswald, Germany		SAF on a smart phone and an online web-based portal	Information was transmitted directly via patients
[48]	Greece	Department of Dermatology and Plastic Surgery in the Athens General Hospital		SAF	
[49]	Guatemala	Division of Dermatology, Albert Einstein College of Medicine, Bronx, NY, USA	Lake Atitlán, Guatemala; Rural clinics	SAF on a smart phone with an application developed by ClickMedix (mobile application/ encrypted website)	medical students served as in-country proxies acting as liaisons between the in-country provider team and remote teledermatologist
[50]	Jordan	Prince Hamzah Hospital in Amman, Jordan	Mafraq Government Hospital and Queen Rania Hospital in Jordan	Live-interactive videoconferencing	
[51]	Mexico	Department of Dermatology General Hospital of Mexico in Mexico City	Rural clinic in a small island	SAF with social media Facebook used as the web-based platform	
[52]	Mongolia	Mongolian National University of Medical Sciences in Ulaanbaatar, Mongolia.	Districts Dhovd, Khuvgul, and Bulgan	SAF with mobile phone based, open source software platform data uploaded to Open MRS (electronic record system)	
[53]	New Zealand	Department of Dermatology of Health Waikato in Hamilton	Taumarunui Hospital, Taupo Health Centre and the Ranolf Medical Centre	Live-interactive videoconferencing	in association with the UK Multicentre Teledermatology trials
[54]	Pakistan	Department of Pakistan Institute of Medical Sciences in Islamabad, Pakistan	Islamabad, Pakistan; Department of Pakistan Institute of Medical Sciences Institute of Dermatology King Edward Medical College Lahore	SAF using TelmedPak web-based platform	
1-[39] 2- [55]	South Africa	1- Telemedicine Unit of the University of Transkei (UNITRA) in Umtata 2- Port Shepstone Hospital	1- Port St. John's, South Africa 2- Durban, South Africa; Nelson R Mandela School of Medicine in	1- SAF using the iPath application network 2- Live-interactive videoconferencing	
1- [56] 2-[57]	Spain		1- Aragón, Spain	1-SAF web-based	2- ongoing
1- [58] 2- [59]	Sweden	1&2-Department of Dermatology at Sahlgrenska University Hospital	1-Referred by general practitioners in Gothernberg, Sweden 2-unknown	SAF 1- mms messaging on a mobile phone 2- Tele-Dermis and iDoc24 mobile application	

Table 3. Humanitarian Telehealth Networks.

Name of Network	Countries Served	Interface Used	Program Information
Swinfen Charitable Trust	Timor-Leste, Papua New Guinea, Cambodia, Sri Lanka, Nepal, Iraq, Afghanistan	Email	Second opinions delivered to doctors in developing nations via volunteer specialists around the world. Consults are offered in 30 different specialties, with dermatology being one of the most common [61].
Telederm	*Africa Telederm Project:* Swaziland, Lesotho, Botswana, Liberia, Eritrea, Malawi, Burkina Faso, Mozambique, Uganda, Kenya, Tanzania, Nigeria	Web based platform: http://www.telederm.org	Request is sent with relevant clinical information, and up to 3 images are uploaded and sent to an expert. Correspondence is private. Images can also be sent to an online discussion forum[62].
iPath	Solomon islands, Lithuania, Switzerland *RAFT (Réseau en Afrique Francophone pour la Télémédecine):* Mauritania, Congo (Brazzaville), Benin, Burundi, Tunisia, Chad, Senegal, Rwanda, Mali, Niger, Burkina Faso, Madagascar, Cameroon, Cote D'Ivoire, Morocco, Algeria, Congo (Kinshasa) *Medecins Sans Frontiers:* South Sudan, Congo (Kinshasa), Ethiopia	Web based platform: http://www.openclinical.org/os_iPath.html	Open access telemedicine platform hybrid web and email application for exchange of medical knowledge, distance consultations, group discussions and distance teaching in medicine[39]

Table 4. World Internet Usage and Population Statistics.

World Region	Internet Users 2000	Internet Users 2015	Growth 2000-2015
Africa	4,514,400	318,633,889	6,958.2 %
Latin America/Caribbean	18,068,919	322,422,164	1,684.4 %
Middle East	3,284,800	113,609,510	3,358.6 %

non-English speaking regions. Also, because a majority of the countries without a known teledermatology program were the least populous, it is possible that there is not a significant need for dermatologists in these areas.

Conclusion

In areas that do not have access to dermatologic care due to distance or simple manpower, teledermatology seems like an ideal solution to reach the underserved. However, many factors such as cost, lack of access to modern communication, and underdeveloped infrastructure serve as major obstacles to its widespread use. Teledermatology has been demonstrated to be feasible and diagnostically accurate in many different settings. Although teledermatology programs are more prevalent in developed countries, non-profit/charitable humanitarian health networks have been able to serve many developing regions with a free and an easy-to-use interface. Future efforts need to focus on expanding the outreach of these existing humanitarian telehealth networks and/or simple, inexpensive technology and strategies to sustain programs in developed countries and developing countries that suffer from a high burden of disease with limited resources.

References

1. http://www.who.int/goe/publications/goe_telemedicine_2010.pdf.
2. http://www.americantelemed.org/about-telemedicine/what-is-telemedicine - .VeXbaE-v4vwI.
3. Perednia DA, Brown NA (1995) Teledermatology: one application of telemedicine. *Bull Med Libr Assoc* 83: 42-47. [Crossref]
4. https://www.aad.org/members/practice-and-advocacy-resource-center/practice-arrangements-and-operations/teledermatology.
5. http://www.merritthawkins.com/pdf/a-review-of-physician-to-population-ratios.pdf.
6. http://www.ifd.org/about-ifd/who-we-help.
7. Burns DA (2004) Introduction and historical bibliography, in Rook' Textbook of Dermatology. Oxford: Blackwell Science. 1.1-1.7.
8. Wang Z, Gu H (2009) A review of telemedicine in China. *J Telemed Telecare* 15: 23-27. [Crossref]
9. https://one.telehealth.ph/beta/2015/01/21/pds-and-nthc-collaborates-trains-new-specialists-for-teledermatology/.
10. Lipoff JB, Cobos G, Kaddu S, Kovarik CL (2015) The Africa teledermatology project: A retrospective case review of 1229 consultations from sub-Saharan Africa. *Journal of the American Academy of Dermatology* 72: 1084-1085. [Crossref]
11. Shin H, Kim DH, Ryu HH, Yoon SY, Jo SJ (2014) Teledermatology consultation using a smartphone multimedia messaging service for common skin diseases in the Korean army: a clinical evaluation of its diagnostic accuracy. *J Telemed Telecare* 20: 70-74. [Crossref]
12. Delaigue S, Morand JJ, Olson D, Wootton R, Bonnardot L (2014) Teledermatology in Low-Resource Settings: The MSF Experience with a Multilingual Tele-Expertise Platform. *Front Public Health* 2: 233. [Crossref]
13. Vega S, Marciscano I, Holcomb M, Erps KA, Major J, et al., (2013) Testing a top-down strategy for establishing a sustainable telemedicine program in a developing country: the Arizona telemedicine program-US Army-Republic of Panama Initiative. *Telemed J E Health* 19: 746-753. [Crossref]
14. National Telehealth Center, Health workers in cordillera trained on DOH' telemedicine project. 2013.
15. Assis TG, Palhares DM, Alkmim MB, Marcolino MS (2013) Teledermatology for primary care in remote areas in Brazil. *J Telemed Telecare* 19: 494-495. [Crossref]
16. Weinberg J, Kaddu S, Kovarik C (2012) Teledermatology in Developing Countries, in Telemedicine in Dermatology, Springer Berlin Heidelberg. p. 43-53.
17. Oliveira TC, Branquinho MJ, Gonçalves L (2012) State of the art in telemedicine-concepts, management, monitoring and evaluation of the telemedicine Programme

in Alentejo (Portugal). *Studies in Health Technology and Informatics* 179: 29-37. [Crossref]

18. Armstrong AW, Wu J, Kovarik CL, Goldyne ME, Oh DH, et al., (2012) State of teledermatology programs in the United States. *J Am Acad Dermatol* 67: 939-944. [Crossref]

19. Desai B, McKoy K, Kovarik C (2010) Overview of international teledermatology. *Pan Afr Med J* 6: 3. [Crossref]

20. Crompton P, Motley R, Morris A (2010) Teledermatology - the Cardiff experience. *J Vis Commun Med* 33: 153-158. [Crossref]

21. Kaddu S, Soyer HP, Gabler G, Kovarik C (2009) The Africa Teledermatology Project: preliminary experience with a sub-Saharan teledermatology and e-learning program. *J Am Acad Dermatol* 61: 155-157. [Crossref]

22. Kaddu S, Kovarik C, Gabler G, Soyer PH (2009) Teledermatology in developing countries, in Telehealth in the Developing World. International Development Research Centre: Ottawa, ON. p. 121-134.

23. Sánchez C, Triana E, Romero E (2008) A flexible web oriented Telehealth platform using a RIM-HL7 Based Model. in 2008 Euro American Conference on Telematics and Information Systems, EATIS 2008, Aracaju.

24. McManus J, Salinas J, Morton M, Lappan C, Poropatich R (2008) Teleconsultation program for deployed soldiers and healthcare professionals in remote and austere environments. *Prehosp Disaster Med* 23: 210-216. [Crossref]

25. Jemec GB, Heidenheim M, Dam TN, Vang E (2008) Teledermatology on the Faroe Islands. *Int J Dermatol* 47: 891-893. [Crossref]

26. Mars M (2007) Telemedicine in KwaZulu-Natal: From failure to cautious optimism. *Journal of Telemedicine and Telecare* 13: 57-59.

27. See A, Lim AC, Le K, See JA, Shumack SP (2005) Operational teledermatology in Broken Hill, rural Australia. *Australas J Dermatol* 46: 144-149. [Crossref]

28. Cho JM (2005) TEIN-based teledermatological service system among Korea, China and Austria. in 2005 27th Annual International Conference of the Engineering in Medicine and Biology Society, IEEE-EMBS 2005. Shanghai.

29. Lawton S (2004) Development of a district-wide teledermatology service. *Nurs Times* 100: 38-41.

30. Schmid-Grendelmeier P, Doe P, Pakenham-Walsh N (2003) Teledermatology in sub-Saharan Africa. *Curr Probl Dermatol* 32: 233-246.

31. Mallett RB (2003) Teledermatology in practice. *Clin Exp Dermatol* 28: 356-359. [Crossref]

32. Schmid-Grendelmeier P1, Masenga EJ, Haeffner A, Burg G (2000) Teledermatology as a new tool in sub-saharan Africa: an experience from Tanzania. *J Am Acad Dermatol* 42: 833-835. [Crossref]

33. Bilalovic N, Paties C, Mason A (1998) Benefits of using telemedicine and first results in Bosnia and Herzegovina. *J Telemed Telecare* 4: 91-93. [Crossref]

34. Valenzuela J, Arguello A, Cendales JG, Rizo CA (2007) Web-based asynchronous teleconsulting for consumers in Colombia: a case study. (1438-8871 (Electronic)).

35. Poropatich, R.K., et al., The U.S. Army telemedicine program: general overview and current status in Southwest Asia. *J Med Internet Res* 9: e33. [Crossref]

36. Klaz I, Wohl Y, Nathansohn N, Yerushalmi N, Sharvit S, et al., (2005) Teledermatology: quality assessment by user satisfaction and clinical efficiency. *Isr Med Assoc J* 7: 487-490. [Crossref]

37. Kaliyadan, F., et al., Mobile teledermatology--patient satisfaction, diagnostic and management concordance, and factors affecting patient refusal to participate in Saudi Arabia. *J Telemed Telecare* 19: 315-319. [Crossref]

38. Janardhanan L1, Leow YH, Chio MT, Kim Y, Soh CB (2008) Experience with the implementation of a web-based teledermatology system in a nursing home in Singapore. *J Telemed Telecare* 14: 404-409. [Crossref]

39. Brauchli K1, O'mahony D, Banach L, Oberholzer M (2005) iPath - a Telemedicine Platform to Support Health Providers in Low Resource Settings. *Stud Health Technol Inform* 114: 11-7. [Crossref]

40. Arican O (2007) E-dermatology: emails about dermatological diseases on the Internet. *J Dermatol* 34: 375-80. [Crossref]

41. Rotger VI (2011) Teledermatology: An experience in Tucumán. 8th Argentinean Bioengineering Society Conference, SABI 2011 and 7th Clinical Engineering Meeting.

42. Ezzedine K, Amiel A, Vereecken P, Simonart T, Schietse B, et al., (2008) Black Skin Dermatology Online, from the project to the website: a needed collaboration between North and South. *J Eur Acad Dermatol Venereol* 22:1193-1199. [Crossref]

43. Gatica, JL, Bertoló S, Morales E, Espinoza M, Contreras C (2015) Store-and-forward teledermatogy in Chile: A contribution to primary health care. *Piel* 30: 148-154.

44. Zarchi K, Haugaard VB, Dufour DN, Jemec GB (2015) Expert advice provided through telemedicine improves healing of chronic wounds: prospective cluster controlled study. *J Invest Dermatol* 135: 895-900. [Crossref]

45. Tran K, Ayad M, Weinberg J, Cherng A, Chowdhury M, et al., (2011) Mobile teledermatology in the developing world: implications of a feasibility study on 30 Egyptian patients with common skin diseases. *J Am Acad Dermatol* 64: 302-309. [Crossref]

46. Lamminen H, Tuomi ML, Lamminen J, Uusitalo H (2000) A feasibility study of realtime teledermatology in Finland. *J Telemed Telecare* 6: 102-107. [Crossref]

47. Berndt RD, Takenga MC, Kuehn S, Preik P, Dubbermann D, et al., (2012) Development of a mobile teledermatology system. *Telemed J E Health* 18: 668-673. [Crossref]

48. Maglogiannis I (2004) Design and implementation of a calibrated store and forward imaging system for teledermatology. *J Med Syst* 28: 455-467. [Crossref]

49. Greisman L, Nguyen TM, Mann RE, Baganizi M, Jacobson M, et al. (2015) Feasibility and cost of a medical student proxy-based mobile teledermatology consult service with Kisoro, Uganda, and Lake Atitlan, Guatemala. *Int J Dermatol* 54: 685-692. [Crossref]

50. Al Quran HA, Khader YS, Ellauzi ZM, Shdaifat A (2015) Effect of real-time teledermatology on diagnosis, treatment and clinical improvement. *J Telemed Telecare* 21: 93-99. [Crossref]

51. Garcia-Romero MT1, Prado F, Dominguez-Cherit J, Hojyo-Tomomka MT, Arenas R (2011) Teledermatology via a social networking web site: a pilot study between a general hospital and a rural clinic. *Telemed J E Health* 17: 652-655. [Crossref]

52. Byamba K, Syed-Abdul S, García-Romero M, Huang CW, Nergyi S, et al. Mobile teledermatology for a prompter and more efficient dermatological care in rural Mongolia. *Br J Dermatol* 173: 265-267. [Crossref]

53. Oakley AMM, Rennie MH (2004) Retrospective review of teledermatology in the Waikato, 1997-2002. *Australas J Dermatol* 45: 23-28. [Crossref]

54. Rashid E, Ishtiaq O, Gilani S, Zafar A (2003) Comparison of store and forward method of teledermatology with face-to-face consultation. *J Ayub Med Coll Abbottabad* 15: 34-36. [Crossref]

55. Mars M, Dlova N (2008) Teledermatology by videoconference: Experience of a pilot project. *South African Family Practice* 50: 70-70d.

56. Moreno-Ramirez D, Ferrandiz L, Nieto-Garcia A, Carrasco R, Moreno-Alvarez P, et al. (2007) Store-and-forward teledermatology in skin cancer triage: Experience and evaluation of 2009 teleconsultations. *Arch Dermatol* 143: 479-484. [Crossref]

57. Lasierra N, Alesanco A, Gilaberte Y, Magallón R, García J (2012) Lessons learned after a three-year store and forward teledermatology experience using internet: Strengths and limitations. *Int J Med Inform* 81: 332-343. [Crossref]

58. Börve A1, Holst A, Gente-Lidholm A, Molina-Martinez R, Paoli J (2012) Use of the mobile phone multimedia messaging service for teledermatology. *J Telemed Telecare* 18: 292-296. [Crossref]

59. Börve A1, Terstappen K, Sandberg C, Paoli J (2013) Mobile teledermoscopy-there's an app for that! *Dermatol Pract Concept* 3:41-48. [Crossref]

60. https://www.census.gov/population/international/data/countryrank/rank.php.

61. Wootton R, Youngberry K, Swinfen P, Swinfen R (2014) Prospective case review of a global e-health system for doctors in developing countries. *J Telemed Telecare* 10 Suppl 1: 94-6. [Crossref]

62. Massone C, Maak D, Hofmann-Wellenhof R, Soyer HP, Frühauf J (2014)

Teledermatology for skin cancer prevention: an experience on 690 Austrian patients. *J Eur Acad Dermatol Venereol* 28: 1103-1108. [Crossref]

63. Houghton V (2015) The full picture: Experts detail the benefits and limitations of teledermatology. *Dermatology World* 19-23.

64. http://www.internetworldstats.com/stats.htm.

65. https://gsmaintelligence.com/research/?file=130828-scaling-mobile.pdf&download.

Copyright: ©2015 Gaffney R. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.